

STUDIES IN THE GENERA OF THE DIOSMEAE (RUTACEAE): 8

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ABSTRACT

Three new species of *Euchaetis*, three new species of *Acmadenia* and four new species of *Diosma* are described.

UITTREKSEL

STUDIES IN DIE GENERA VAN DIE DIOSMEAE (RUTACEAE): 8

Drie nuwe *Euchaetis* soorte, drie nuwe *Acmadenia* soorte en vier nuwe *Diosma* soorte word beskryf.

Euchaetis cristagalli Williams, sp. nov. earum foliis lineari-lanceolatis propria propter petala longissimas mox deciduas.

Frutex 0,3–0,5 m, laxis, diffusus, ad basim monocalis. *Rami* teretes, laxi, graciles, pauci, dichotomi, glabrescenti. *Ramuli* pauci, erecti, gracilliores, rubescens, puberuli. *Folia* 6–19 mm longa, 1–1,3 mm lata, lineari-lanceolata, acuta, mucronata, breve petiolata, glabra, alterna, glanduloso-punctata, marginibus anguste hyalinis minute ciliolato-serrulatis. *Inflorescentia* 7,5 mm diam., terminalia, pauci-aggregata. *Bractea* 1,3–3,7 mm longa, 0,6–0,9 mm lata, oblonga, obtusa, glabra, mucronulata, glanduloso-punctata, marginibus hyalinis ciliolato-serrulatis. *Bracteolae* duae, 1,1 mm longae, 0,5–0,6 mm latae, ellipticae, obtusae, glabrae, mucronulatae, glanduloso-punctatae, marginibus late hyalinis ciliolatis. *Sepala* quinque, 2,5 mm longa, 1,2–1,3 mm ad basim lata, lanceolata, obtusa, mucronulata, glabra, multi-glanduloso-punctata, marginibus late hyalinis. *Petala* quinque, 5,5 mm longa, mox decidua; *limbus* 3,5 mm longus, 1,8 mm latus, ellipticus, sub-acuteus, niveus, patens; *unguis* 2 mm longum, 1,1 mm latum, forte transverse barbatum, ciliatum. *Staminodia* quinque, minutis tumulis deminuta. *Fila* quinque, 1,3 mm longa, glabra. *Antherae* quinque, ante anthesin 1,1 mm longae, 0,75 mm latae, vinosae, glandula coronata. *Pollen* 50 μ longum, 21 μ latum, oblongum. *Discus* viridus, succulentus, ovarium obvallens, nectarifer. *Stigma* 0,35 mm diam., capitatum, viridum. *Stylus* 1,3 mm longus, erectus, glaber. *Ovarium* 5-carpellatum, 0,6 mm longum, 0,6 mm diam., glabrum. *Fructus* 5-carpellatus, 5,5–6,5 mm longus, 4,3 mm diam., glaber, viridus, minute glanduloso-punctatus; *cornua* 1 mm longa, erecta. *Semen* 3,5–3,8 mm longum, 1,6–1,8 mm latum, piceum, nitens.

Type: CAPE—3324 (Steytlerville): east of Cockscomb, Great Winterhoek Mtns., Uitenhage Division (-DB), 915–975 m (3 000–3 200 ft.) alt., 9/3/1977, *Williams 2283* (NBG, holotype; BOL, K, L, MO, PRE, S, STE, isotypes).

This plant was discovered by Miss Elsie Esterhuysen in 1957. She deserves all praise for noticing such an insignificant little shrub; one which could so easily be overlooked by any other collector. Her contribution to our knowledge of Cape plants must forever outshine that of all our other great botanical collectors.

Shrubs 0,3–0,5 m tall, lax and somewhat diffuse in low fynbos, arising from a single stem at ground level. *Branches* terete, lax, slender, few in number, dichotomous, reddish-brown, becoming glabrous with the cuticle splitting off. *Branchlets* few in number, erect, very slender, reddish-brown, puberulous, not hidden by the leaves. *Leaves* 6–19 mm long (mostly $\pm$ 9 mm), 1–1,3 mm broad, linear-lanceolate, acute, mucronate, short-petiolate, glabrous, alternate, adpressed-erect, erect or on low shoots spreading; margins narrowly translucent, minutely ciliolate-serrulate; adaxial surface concave; abaxial surface convex, gland-dotted on either side of the midrib. *Inflorescence* terminal, solitary, on much reduced branchlets crowded together into small groups. *Bract* 1,3–3,7 mm long, 0,6–0,9 mm broad, asymmetrically oblong, obtuse, glabrous; apex with a small blunt mucro; margins translucent, in part minutely ciliolate-serrulate; abaxial surface gland-dotted to either side of the midrib. *Bracteoles* two, 1,1 mm long, 0,5–0,6 mm broad, elliptic, obtuse, glabrous; apex with a minute blunt mucro; margins broadly translucent, minutely ciliolate; abaxial surface minutely gland-dotted. *Calyx lobes* five, 2,5 mm long, 1,2–1,3 mm broad at the base, lanceolate, glabrous; apex somewhat obtuse with a minute reddish mucro; margins broadly translucent, minutely ciliolate; abaxial surface with numerous minute gland dots to either side of the midrib. *Petals* five, 5,5 mm long, white, spreading 7,5 mm diam., soon falling away; *limb* 3,5 mm long, 1,8 mm broad, elliptic, sub-acute, abaxial surface obscurely gland-dotted to either side of the midrib; *claw* 2 mm long, 1,1 mm broad, somewhat translucent, strongly transversely bearded, ciliate. *Staminodes* five, reduced to a minute swelling $\pm$ 0,2 mm diam., on the outer surface of the disc at the base of the petal. *Filaments* five, becoming 1,3 mm long, acicular, glabrous, incurved erect. *Anthers* five, before anthesis 1,1 mm long, 0,75 mm broad, wine-coloured with a minute globose gland clasped at the apex. *Pollen* 50 μ long, 21 μ broad, oblong. *Disc* dark green, fleshy, level on top, surrounds and exceeds the ovary but does not close over it at first. *Stigma* 0,35 mm diam., capitate, globose, green. *Style* erect, glabrous, becoming 1,3 mm long. *Ovary* 5-carpellate, 0,6 mm long, 0,6 mm diam., glabrous; *carpels* with globose apices. *Fruit* 5-carpellate, 5,5–6,5 mm long, 4,3 mm diam., glabrous, green, minutely gland-dotted, becoming striate veined when dry; *horns* 1 mm long, erect. *Seed* 3,5–3,8 mm long, 1,6–1,8 mm broad, black, shining; aril encased in black.

SPECIMENS EXAMINED

CAPE—3324 (Steytlerville): Cockscomb, Great Winterhoek Mts., Uitenhage

Div. (-DB), rocky E. slopes, 2 000–4 000 ft., 3/3/1957, *Esterhuysen* 27156 (BOL); ridge on N. slopes, 4 000 ft., 2/2/1958, *Esterhuysen* 27539 (BOL); E. of Cockscomb, Great Winterhoek Mts., Uitenhage Div., S. facing T.M.S. slopes on Forestry track above Elandskroon farm, 915–975 m (3 000–3 200 ft.) alt., 9/3/1977, *Williams* 2283 (NBG, BOL, K, L, MO, PRE, S, STE).

—3325 (Port Elizabeth): Great Winterhoek Mts., Groot Plaat 282, Uitenhage Div. (-CA), S.E. exposure, 2 450 ft., 1/3/1974, *Scharf* 1182 (PRE).

DISTRIBUTION AND BIOLOGY

Euchaetis cristagalli has been found growing on quartzitic stony soil in low fynbos in which *Leucadendron loeriense* Williams forms a conspicuous element, in the Great Winterhoek Mountains from the Cockscomb eastwards towards the Strydomsberg, a distance of about 33 kilometres, at altitudes of between 610 and 1 220 m above sea level. This range, consisting of rocks of the Table Mountain Series, forms a spur at the easternmost end of the Cape folded belt. No other plant in the genus *Euchaetis* is to be found any further to the east. In early March when the type collection was made plants were found bearing buds, flowers and ripe fruits so one may deduce that flowering may commence as early as December and that fruiting may still be taking place as late as May. The relatively large petals and the nectariferous disc would indicate that this plant is pollinated by insects. Regeneration appears to take place from seed after fires. The leaves when crushed give off a very faint mouldy smell.

DISCUSSION

The one character that places this plant in the genus *Euchaetis* is the possession of transversely bearded petals. This pubescence forms a screen beneath which the reproductive parts of the flower are effectively concealed. Other characters that also exclude it from other genera of the *Diosmeae* are: (1) flowers terminal in reduced racemes; (2) *staminodes* vestigial; (3) *anther* with a minute apical gland; (4) *disc* exceeds the ovary as a vertical wall; (5) *stigma* capitate; (6) *style* and *filaments* short and glabrous; (7) *ovary* 5-carpellate.

Euchaetis cristagalli is most easily recognised as distinct from other species of *Euchaetis* with linear-lanceolate leaves because of its having the longest petals. It has been observed that these petals very readily fall away. *E. cristagalli* may be distinguished from *E. elata* which has leaves sessile, pubescent on the adaxial surface and flowers sessile $\pm$ 3-nate with the style at some time deflexed; from *E. glomerata* which has broader leaves and smaller flowers in multi-florous heads; from *E. flexilis* which has leaves with sacculate apices and broad translucent margins. It is perhaps nearest in appearance to *E. linearis* which however has leaves with only two rows of gland dots, flowers in many flowered heads with small petals and a disc that stands open, not obvallate. The name refers to the locality where this plant occurs.

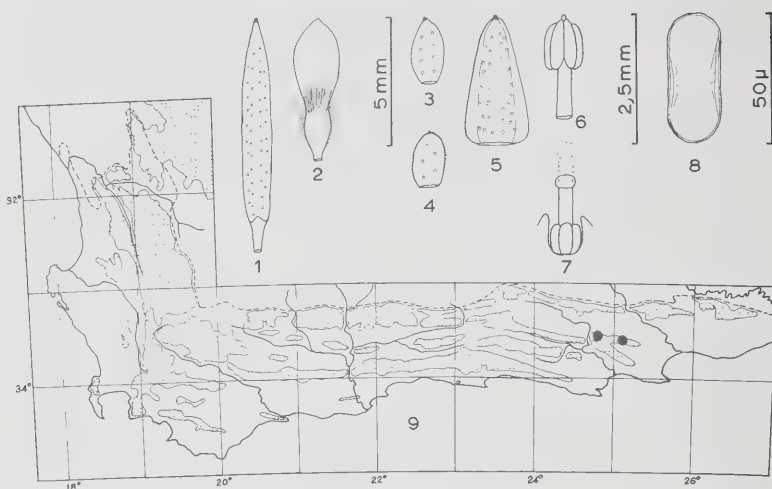


FIG. 1

Euchaetis cristagalli: 1, leaf. 2, petal. 3, bract. 4, bracteole. 5, calyx lobe. 6, anther. 7, gynoecium and disc. 8, pollen. 9, distribution.

***Euchaetis esterhuysenae* Williams, sp. nov.** propria propter folia parva ovata sessilia alterna patentia, flores parva.

Frutex 0,6 m altus, 2 m diam., densus, ad basim monocaulis. *Rami* numerosi, patentes, rigidi, graciles, flexuosi, saepe dichotomi; *cortex* aspera, cinerea. *Ramuli* brevi, graciles, erecti, dichotomi, rubescenti, sparsim puberuli vel glabri. *Folia* 2,2–3,2 mm longa, 1,5–2 mm lata, ovata, obtusa, obtusa-mucronata, glabra, glanduloso-punctata, crassa, sessilia, alterna, patentia, marginibus crassis, anguste hyalinis, minute serrulatis. *Inflorescentia* terminalia; *flores* 3,3 mm diam., sessiles, reducto-racemosi. *Bractea* 1,5–2,8 mm longa, 1–1,5 mm lata, elliptica, obtusa, rubro-callosa, crassa, glabra, sparsim glanduloso-punctata, marginibus minute serrulatis. *Bracteolae* duae, 1–1,3 mm longae, 0,6–0,8 mm latae, ellipticae, obtusae, rubro-callosae, glabrae, sparsim glanduloso-punctatae, marginibus hyalinis ciliolatis. *Sepala* quinque, 1,5–1,8 mm longa, 1–1,4 mm lata, oblonga, obtusa, rubro-callosa, sparsim glanduloso-punctata, intus pubescentia, marginibus late hyalinis, ciliolatis. *Petala* quinque, 2,5–3 mm longa, alba, erecta deinde parum patentia; *limbus* 1,2 mm longus, 1,2 mm latus, transverse barbatus, sparsim ciliatus, costa villosa. *Staminodia* quinque, 0,1–0,2 mm longa. *Fila* quinque, 1,2 mm longa, glabra, subulata. *Antherae* ante anthesin 1 mm longae, 0,7 mm latae, vinosae, glandula 2 mm diam., coronata. *Pollen* 45 μ longum, 23 μ latum, oblongum. *Discus* obvallatus, nectarifer, vinosus. *Stigma* 0,2 mm diam., capitatum, globosum, viridum. *Stylus* primus deflexus deinde erectus, 1,2 mm

longus, glaber. *Ovarium* 5-carpellatum, 0,6 mm diam., glabrum. *Fructus* 5-carpellatus, 7,5 mm longus, 6,5 mm diam., glaber, nitens, vinosus, multi-glanduloso-punctatus; *corna* 1,5 mm longa. *Semen* 4,7 mm longum, 2–2,2 mm latum, piceum, nitens.

Type: CAPE—3219 (Wupperthal): ridge S.E. of Bloukop, E. Cold Bokkeveld, Ceres Div. (-CB), 1 450–1 550 m (4 800–5 000 ft.) alt., 18/5/1977, *Williams 2304* (NBG, holotype; BOL, K, L, MO, PRE, S, STE, isotypes).

Euchaetis esterhuysenae is appropriately named in honour of Miss Elsie Esterhuysen of the Bolus Herbarium because, out of the twenty times that it has been collected, thirteen are hers. She discovered this species in March 1940 on the summit of the Suurvleisberg, a most daunting mountain peak. Subsequently it was also collected a few times by T. Stokoe.

Shrubs 0,6 m tall, 2 m diam., with many branches spreading from the base at ground level, forming a dense wiry shrub; *wood* yellow in colour. *Branches* numerous, spreading, rigid, fairly slender, flexuose, often dichotomous; bark rough, grey. *Branchlets* short, slender, erect, dichotomous or single by abortion, reddened, thinly puberulous, not hidden by the leaves. *Leaves* 2,2–3,2 mm long, 1,5–2 mm broad, ovate, apex sacculate when dry, obtuse with a blunt sometimes reddened callus, fleshy, glabrous, sessile, spreading, alternate; margins thick, narrowly translucent, minutely serrulate; abaxial surface gland-dotted to either side of the midrib. *Inflorescence* terminal, 3,3 mm diam., flowers white, sessile in reduced racemes, the uppermost being the latest to bloom. *Bract* 1,5–2,8 mm long, 1–1,5 mm broad, elliptic, obtuse, red-callused, fleshy, glabrous, sparingly gland-dotted, margins minutely serrulate. *Bracteoles* two, 1–1,3 mm long, 0,6–0,8 mm broad, elliptic, obtuse, red-callused, glabrous, sparingly gland-dotted, margins translucent, ciliate. *Calyx lobes* five, 1,5–1,8 mm long, 1–1,4 mm broad, oblong, obtuse, red-callused, sparingly gland-dotted, margins minutely serrulate above, translucent and ciliate below, adaxial surface pubescent. *Petals* five, 2,5–3 mm long, white, at first erect, later spreading slightly and readily falling away; *blade* 1,2 mm long, 1,1 mm broad, elliptic, obtuse; *claw* 1,8 mm long, 1,2 mm broad, narrowing to the base, transversely bearded above with strong thick hairs, margins sparsely ciliate, midrib villous. *Staminodes* five, vestigial, 0,1–0,2 mm long, on the outer edge of the disc. *Filaments* five, becoming 1,2 mm long, glabrous, subulate. *Anthers* five, 1 mm long, 0,7 mm broad, wine-coloured, apical gland 2 mm diam., pale, globose, inclined inwards. *Pollen* 45 μ long, 23 μ broad, oblong. *Disc* equalling or slightly exceeding the ovary, erect and level all round, wine-coloured, exudes nectar. *Stigma* 0,2 mm diam., capitate, globose, green. *Style* at first deflexed becoming erect, 1,2 mm long, glabrous. *Ovary* 5-carpellate, 0,6 mm diam., glabrous. *Fruit* 5-carpellate, 7,5 mm long, 6,5 mm diam., glabrous, shining, wine-coloured, with many gland

dots; horns 1.5 mm long, darker in colour with an immersed apical gland. Seed 4.7 mm long, 2–2.2 mm broad, black, shining; endosperm not conspicuous.

SPECIMENS EXAMINED

CAPE—3219 (Wupperthal): Cedarberg Mtns., Krakadouwsberg, Clanwilliam Division (-AA), 30/12/1941, *Esterhuysen* 7497 (BOL, SAM, NBG), 6 000 ft., 22/9/1942, *Esterhuysen* 8054 (BOL); N. Cedarberg Mtns., rocky summit of Great Krakadouw Peak, 5 700 ft., 20/11/1945, *Esterhuysen* 12100 (BOL), -/1/1942, *Stokoe s.n.* (SAM 59345); summit of the Suurvelisberg (Suurvlaksekop) (-AC), 5 300 ft., -/3/1940, *Esterhuysen* 2555 (BOL, NBG); Cedarberg Mtns., Langeberg, 6 000 ft., 15/12/1941, *Esterhuysen* 7357 (BOL, NBG), 5 800 ft., 15/12/1973, *Williams* 1768 (NBG); Cedarberg Mtns., rocky slope below Tafelberg, 5 000 ft., 27/12/1947, *Esterhuysen* 14347 (BOL); Cedarberg Mtns., Uityk Peak, 16/12/1941, *Esterhuysen* 7382 (BOL); ledge on S. side below summit of Olifants River Dome, 5 000 ft., 16/4/1949, *Esterhuysen* 15286 (BOL); Donkerkloof Peak near Citrusdal, Clanwilliam Division (-CA), -/1/1945, *Stokoe* 9142 (BOL); Top of Hexberg, Clanwilliam Division, -/3/1951 *Stokoe s.n.* (SAM 66817); S. Cedarberg Mtns., Clanwilliam Division, rocks on Sneeuwberg, 6 000 ft., 1/3/1947, *Esterhuysen* 13835 (BOL); Elands-kloof N. side on summit of peak, Clanwilliam Division, 3/10/1940, *Esterhuysen* 3194 (BOL); S. Cedarbergen, Apollo Peak, rocky slopes, 4 500–5 000 ft., 13/12/1950, *Esterhuysen* 18040 (BOL); S. Cedarberg, peak between Gideonskop and Sandfonteinberg, Ceres Division (-CB), 5 000 ft., -/4/1947, *Stokoe s.n.* (SAM 64152); S. Cedarberg, Gideonskop, Ceres Division, rocky kop, 4 500 ft., 6/4/1947, *Esterhuysen* 13886 (BOL); Blaauw-kop, E. Cold Bokkeveld, Ceres Division, rocky plateau and amongst rocks, 1/10/1958, *Esterhuysen* 27900 (BOL); S.E. ridge, 5 000 ft., 24/10/1975, *Williams* 2121 (NBG); 4 800–5 000 ft., 18/5/1977, *Williams* 2304 (NBG, BOL, K, L, MO, PRE, S, STE).

DISTRIBUTION AND BIOLOGY

Euchaetis esterhuysenae is found only near or at the summits of the highest mountains of the Cedarberg and the Northern Cold Bokkeveld from the Krakadouberg in the north to Bloukop in the south, a distance of about 63 km. It grows in rocky places rooted in crevices amongst quartzitic sandstone rocks of the Table Mountain geological series. Most plants seen are very old not having been burnt for many years. A section through the stem of one plant, 15 mm in diameter, showed at least 50 annual growth rings. Plants are also extremely slow-growing. A branch from one plant about 1 m long showed about 53 annual growth increments, making a growth rate of less than 20 mm per year. From the collections made it would appear that *E. esterhuysenae* is in bloom at least from December to May and that fruits may be found from May to October. The observed presence of nectar and the lengthening of the style after the pollen has been shed would indicate that this plant is most probably pollinated by insects. From the appearance

of the plant, regeneration can only take place from seed which is ejected by the usual catapult mechanism when ripe. Young plants may have leaves up to 5 mm long and 3,5 mm broad. Leaves have almost no smell at all when crushed.

VARIATION

Branchlets from plants in the Bloukop area appear to be very thinly puberulous whereas those from other populations are completely glabrous. Also plants with smaller leaves have fewer gland dots but this may be merely a factor of leaf size. Although growing in close association with *Euchaetis elsieae* on Bloukop no hybrids have been observed.

DISCUSSION

The presence of transversely bearded petals places this plant in the genus *Euchaetis*. Other factors which help to exclude it from other genera of the *Diosmeae* are: (1) flowers terminal in reduced racemes; (2) staminodes vestigial; (3) anthers with a small apical gland; (4) disc exceeds the ovary but does not close over it; (5) stigma capitellate; (6) style and filaments short and glabrous; (7) ovary 5-carpellate.

Euchaetis esterhuysenae is recognised as distinct having leaves small, ovate, glabrous, sessile, alternate and spreading, and small flowers with petals that soon fall away.

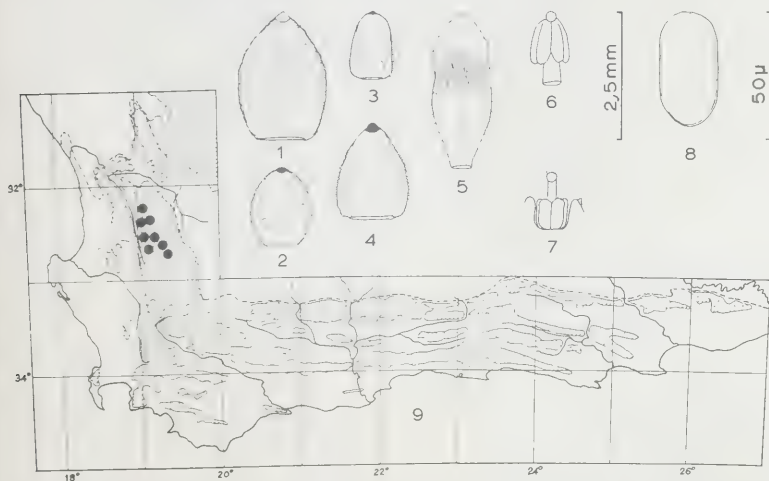


FIG. 2

Euchaetis esterhuysenae: 1, leaf. 2, bract. 3, bracteole. 4, calyx lobe. 5, petal. 6, anther. 7, gynoecium and disc. 8, pollen. 9, distribution.



FIG. 3

Euchaetis esterhuysenae: 1, flower with petals erect at anthesis.



FIG. 4
Euchaetis esterhuysenae: Flower with petals delapsd showing the red disc.

Euchaetis vallis-simiae Williams, sp. nov. propria propter folia scabro-tomentosa, post apices conspicue gibbosos, stylum erectum, stigma 0,7 mm diam. capitatum.

Frutex ad 1,20 m, erectus, ad basim monocaulis. *Rami* erecti, recti, puberuli, rubescenti. *Ramuli* erecti, puberuli, foliosi. *Folia* 5–8 mm longa, 2,5–2,8 mm lata, elliptica, tota scabro-tomentosa, alterna, sub-imbricata, ad basim adpressa, petiolata, post apices conspicue gibbosi, forte costata, glanduloso-punctata. *Inflorescentia* terminalia, 1–4 nata; *calyx* tomentosus; *flos* 7 mm diam., sessilis. *Bractea* 4,8–5 mm longa, 2–2,2 mm lata, sub-ovoidea, tota scabro-tomentosa, petiolata, post apex gibbosus, forte costata, ciliata, pauci glanduloso-punctata. *Bracteolae* duae, 4,5 mm longae, 1–1,2 mm latae, oblanceolatae, obtusae, tota scabro-tomentosae, post apices conspicue gibbosae, pauci glanduloso-punctatae, ciliatae, marginibus anguste hyalinis. *Sepala* quinque, 3,1–3,3 mm longa, 2–2,2 mm lata, sub-quadrangularia, tota scabro-tomentosa, ciliata, post apices conspicue gibbosi, marginibus anguste hyalinis. *Petala* quinque, 5,6 mm longa; *limbus* 2,1 mm latus, ovatus, ad apice sub-emarginatus et pauci ciliatus, extus tomentosus; *unguis* 1,4 mm latus, forte transverse-barbatus, ciliatus. *Staminodia* quinque, 0,15 mm longa, vestigialia. *Fila* quinque, 1,6 mm longa, glabra. *Anthera* quinque, ante anthesin 1,2 mm longa, 1 mm lata, flava, glandula coronata. *Pollen* 41 μ longum, 30 μ latum, ellipsoideum. *Discus* viridus, succulentus, nectarifer, super ovarium parum cingens. *Stigma* 0,7 mm diam., capitatum, depresso-globosum, viridum. *Stylus* 1,5 mm longus, erectus, glaber, persistens. *Ovarium* 5-carpellatum, 0,7 mm longum, 1 mm diam., carpella ad apices tomentosa. *Fructus* 5-carpellatus, 9 mm longus, 6 mm diam., tota tomentosa; *cornua* 2,5 mm longa, sub-erecta, obtusa. *Semen* 5,5–6 mm longum, 2–2,5 mm latum, piceum, nitens.

Type: CAPE—3323 (Willowmore): Baviaanskloof Forest Reserve at Studtis, on forestry road at end of first plateau (-DB), 915 m (3 000 ft.) alt., 12/10/1976, Williams 2224 (NBG, holotype: AD, B, BOL, K, L, M, MO, NSW, PRE, S, STE, isotypes).

In going through the *Diosmeae* in the Fourcade Herbarium (BOL) I came across a plant, obviously different from any that I had seen in any other herbarium, collected by F. S. Laughton in 1933 at "The Fountains", Forest Reserve, Humansdorp. After enquiring at Humansdorp without success I eventually discovered from the Forestry Department at Knysna that "The Fountains" was on the north side of the Baviaanskloof Mountains near Wolvekraal, south of Steytlerville. But before being able to visit this remote locality, I encountered, amongst the *Acmadenia* incertae at the Compton Herbarium, a collection of the same species by H. C. Taylor made in 1953. With the aid of precise directions from Mr Hugh Taylor, of the Botanical Research Unit at Stellenbosch, I was able to collect this plant with the greatest of ease near Studtis in the Baviaanskloof. The Forester there informed me that he knew the species well and that it was even more abundant on the north side of the Baviaanskloof Mountains.

Shrubs to 1,20 m, erect, single-stemmed at base, not forming a dense bush. *Branches* erect, straight, puberulous, somewhat reddened, slightly roughened by leaf scars, arising more or less in clusters. *Branchlets* fairly short, erect, puberulous, well clothed with leaves but not hidden, light green at first, tending to arise in clusters at all heights in the plant. *Leaves* 5–8 mm long including the petiole 1 mm long, 2,5–2,8 mm broad, elliptic, conspicuously gibbous behind the apex, at base adpressed erect, sub-imbricate, alternate, scabro-tomentose on all sides and margins with erect tapering hairs, midrib prominent with minute gland dots to either side. *Inflorescence* terminal, 1–4 nate; *calyx* puberulous; *flowers* 7 mm diam., sessile, white. *Bract* 4,8–5 mm long, 2–2,2 mm broad, sub-ovoid, scabro-tomentose on all sides, minutely gland-dotted, petiolate, apex reddened and gibbous on the outside, margins ciliate, midrib prominent. *Bracteoles* two, 4,5 mm long, 1–1,2 mm broad, oblanceolate, obtuse, scabro-tomentose on both sides, strongly ciliate, minutely gland-dotted, apex gibbous on the outside, margins narrowly translucent, midrib prominent. *Calyx lobes* five, 3,1–3,3 mm long, 2–2,2 mm broad, sub-quadrangular, scabro-tomentose on both surfaces, ciliate, margins narrowly translucent, apex gibbous on the outside. *Petals* five, 5,6 mm long, soon falling away; *limb* 2,1 mm broad, ovate, spreading, abaxial surface puberulous, apex sub-emarginate with a few cilia; *claw* 1,4 mm broad, narrowing to 0,25 mm at the base, strongly transversely bearded with ciliate margins above. *Staminodes* five, 0,15 mm long, vestigial, a minute blunt point on the outer rim of the disc. *Filaments* five, becoming 1,6 mm long, glabrous, acicular. *Anthers* five, before anthesis 1,2 mm long, 1 mm broad, pale yellow, with a minute globose apical gland. *Pollen* 41 μ long, 30 μ broad, ellipsoid. *Disc* green, fleshy, exudes nectar, fairly level on top, closes somewhat over the ovary. *Stigma* 0,7 mm diam., capitate, depressed globose, green. *Style* becoming 1,5 mm long, erect, glabrous, persisting. *Ovary* 5-carpellate, 0,7 mm long, 1,0 mm diam., apices of lobes globose and densely pubescent. *Fruit* 5-carpellate, 9 mm long, 6 mm diam., scabro-tomentose, sessile, closely imbricated at the base by the persistent calyx lobes which have a white waxy exudate on the inside; *horns* 2,5 mm long, sub-erect, obtuse, dark green or reddened. *Seed* 5,5–6,6 mm long, 2–2,5 mm broad, black, shining with a black and white aril.

SPECIMENS EXAMINED

CAPE—3323 (Willowmore): Baviaanskloof Forest Reserve at Studtis, on forestry road at end of first plateau (-DB), 915 m (3 000 ft.) alt., 12/10/1976, Williams 2224 (NBG, AD, B, BOL, K, L, M, MO, NSW, PRE, S, STE); Kouga Mtns., lower foothills, 3 500 ft., 20/9/1953, Taylor 880 (NBG).
—3324 (Steytlerville): Forest Reserve, The Fountains, Humansdorp Div. (-CB), -/11/1933, Laughton s.n. (BOL-FOURC.).

DISTRIBUTION AND BIOLOGY

This vigorous species appears to occur in both the Kouga and Baviaanskloof

mountains on north-facing slopes where it is, according to the Forester, quite common. When the type collection was made in October it was obvious that the flowering season was nearly over and that fruits were ripening plentifully. The plants were found scattered about three metres apart in arid fynbos, growing in extremely stony ground on a gentle slope. They could be detected by a faint smell of fresh 'red bait' (ascidian). The presence of this smell together with nectar in the flowers would indicate that this plant is insect pollinated. The seeds when ripe are ejected by the usual catapult mechanism. Regeneration must take place only from seed as no coppicing was noticed such as may be observed in those plants that regenerate from a persistent rootstock after fires. The leaves when crushed have a smell of cedar and resin.

DISCUSSION

The transversely bearded petal places this plant in the genus *Euchaetis*. Other factors which reinforce this and at the same time exclude it from other genera of the *Diosmeae* are: (1) flowers 1-4 nate, terminal; (2) *staminodes* vestigial; (3) *anther* with a minute apical gland; (4) *disc* well developed, closes slightly over the ovary; (5) *stigma* capitate; (6) *style* and *filaments* short and glabrous; (7) *ovary* 5-carpellate.

Euchaetis vallis-simiae is recognised as distinct because of having prominently-nerved, elliptic leaves which, with the bracts, bracteoles and calyx lobes, are conspicuously gibbous behind the apex and scabro-tomentose on both sides. It also has an erect style bearing an unusually large capitate stigma.

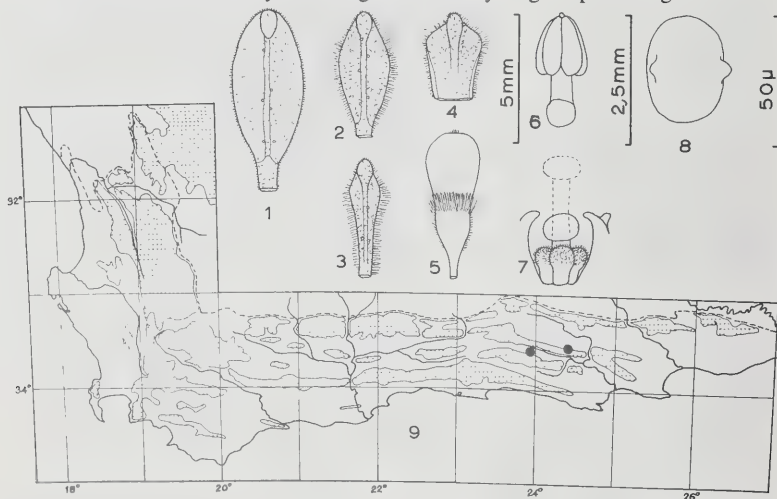


FIG. 5

Euchaetis vallis-simiae: 1, leaf. 2, bract. 3, bracteole. 4, calyx lobe. 5, petal. 6, anther. 7, gynoecium and disc. 8, pollen. 9, distribution.



FIG. 6

Euchaetis vallis-simiae: Flower with transversely bearded petals.

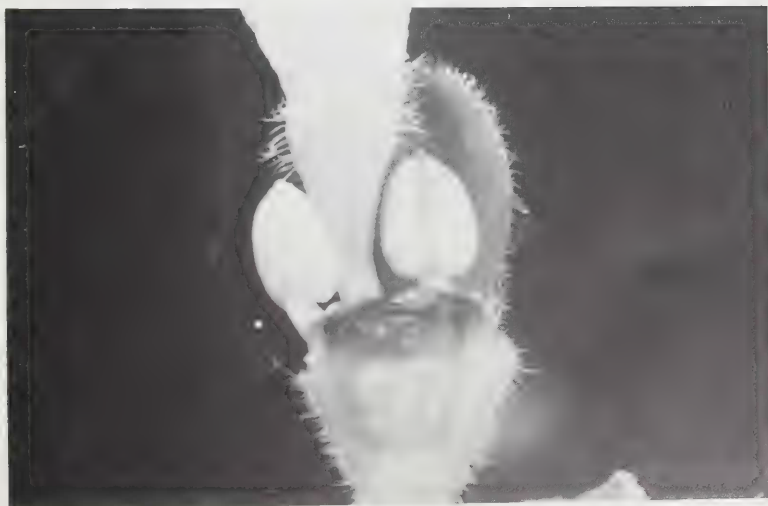


FIG. 7

Euchaetis vallis-simiae: Flower with part removed showing the pubescent ovary, stigma, anthers and disc with nectar.

Acmadenia argillophila Williams, sp. nov. propria propter ramulos 90 ° dichotomos, folia parviora crassa sessilia patentia, flores 10 mm diam. lilacinos, petala orbicularia breve unguiculata patentia, fructum globosum sine cornibus.

Frutex 0,20–0,50 m altus, rigidus, ad basim monocaulis. *Rami* brevi, flexi; cortex asper, cinereus. *Ramuli* brevi, sparsim puberuli, saepe 90 ° dichotomi, expositi. *Folia* 2–3,4 mm longa, 1,4–1,9 mm lata, ovata vel oblonga, obtusa, crassa, glabra, sessilia, patentia, pleurimque opposita, glanduloso-punctata, marginibus crassis. *Inflorescentia* terminalia, 1–4 nata, pleurumque bini; *flos* 1 cm diam., sessilis, lilacinus; alabastrum globosum; calyx glaber. *Bractea* 1 mm longa, 0,9 mm lata, ovata, obtusa, glabra, glanduloso-punctata, sparsim ciliolata, marginibus anguste hyalinis. *Bracteolae* duae, 0,7 mm longae, 0,7 mm latae, sub-ovatae, obtusae, glabrae, glanduloso-punctatae, marginibus ciliolatis, anguste hyalinis. *Sepala* quinque, 1,6 mm longa, 1,6 mm lata, ovata, obtusa, glabra, glanduloso-punctata, rubescentia, apex parum incrassatus, marginibus hyalinis ciliolatis. *Petala* quinque, 4,8–5,2 mm longa, 3,3–3,9 mm lata, breve unguiculata, glabra, lilacina, sparsim glanduloso-punctata. *Staminodia* quinque, 0,5 mm longa, 0,2 mm diam., conica, obtusa. *Filamenta* quinque, post anthesin 2,1 mm longa, acicularia, glabra, rubescentia, incurvo-erecta. *Antherae* quinque, ante anthesin 1,2 mm longae, 1,1 mm latae, vinosae; glandula glutinosa coronata. *Pollen* 44 μ longum, 24 μ latum, oblongum. *Discus* sinuatus, atroviridus, crassus, nectarifer, ovarium aequans. *Stigma* 0,4 mm diam, capitatum, viridum, indistincte 5-lobatum. *Stylus* 0,9 mm longus, glaber, parum flexus. *Ovarium* 5-carpellatum, 0,9 mm longum, 1,1 mm diam., glabrum, apicibus globosis. *Fructus* 5-carpellatus, 13 mm diam., globosus, rubescens vel tri-coloratus, glaber, multi-glanduloso-punctatus, apicibus emarginatis, sine cornibus. *Semen* 5,5 mm longum, 2,5 mm latum, piceum, nitens.

Type: CAPE—3320 (Montagu): Boesmansgat Quarry, 9 km E. of Jan de Boers, Worcester/Laingsburg Division (-AC), 1 006 m (3 300 ft.) alt., 3/8/1977, Williams 2318 (NBG, holotype; BOL, K, MO, PRE, isotypes).

Acmadenia argillophila was apparently collected for the first time in 1965 by Acocks 12 miles due east of Touws River. He informed Mr Hugh Taylor that it was quite probable that he only saw one plant. A recent search failed to rediscover it in this area. However in 1971 it was discovered by both Miss Elsie Esterhuysen and Miss Mary Thompson growing near a small quarry alongside the National Road between Jan de Boers and Constable. Since when the quarry, known as Boesmansgat, has been vastly extended and only five plants remain here. Despite extensive searches no further populations have been found.

Shrubs 0,20–0,50 m tall, rigid, branching from a single stem at ground level. *Branches* short, bent; bark rough, ashy-brown. *Branchlets* short, thinly and minutely puberulous, not hidden by the leaves, often forking at 90 °. *Leaves* 2–3,4 mm long, 1,4–1,9 mm broad, ovate or oblong, obtuse, thick, glabrous, not

shining, sessile, spreading, usually opposite, dorsally gland-dotted; margins thick. *Inflorescence* terminal, 1–4 nate, normally in opposite pairs; *flowers* 10 mm diam., sessile, lilac; *bud* globose; *calyx* glabrous. *Bract* 1 mm long, 0.9 mm broad, ovate, obtuse, glabrous, gland-dotted; margins sparsely ciliate, narrowly translucent. *Bracteoles* two, 0.7 mm long, 0.7 mm broad, sub-ovate, obtuse, glabrous, gland-dotted; margins ciliate, narrowly translucent on all sides. *Calyx lobes* five, 1.6 mm broad, 1.6 mm long, ovate, obtuse, glabrous, gland-dotted, somewhat reddened; apex slightly thickened; margins ciliate, translucent. *Petals* five, 4.8–5.2 mm long, 3.3–3.9 mm broad, glabrous, lilac, with a few gland dots dorsally near the midrib; *limb* orbicular, spreading, margins very sparsely setulose; *claw* about 0.8 mm long, 0.7 mm broad. *Staminodes* five, 0.5 mm long, 0.2 mm diam., conic-obtuse, pale-translucent, arising on the outer side of the disc adjacent to the petals. *Filaments* five, becoming 2.1 mm long, acicular, glabrous, reddened below, apex purplish, incurved erect. *Anthers* five, before anthesis 1.2 mm long including the apical gland, 1.1 mm broad, wine-coloured; apical gland leaning inwards, becoming sticky-tipped before anthesis; thecae rather distant. *Pollen* 44 μ long, 24 μ broad, oblong, slightly waisted. *Disc* sinuate, dark green, fleshy, exudes nectar, never exceeds the ovary. *Stigma* 0.4 mm diam., capitate, green, indistinctly 5-lobed. *Style* becoming 0.9 mm long, glabrous, somewhat bent, sometimes persisting. *Ovary* 5-carpellate, 0.9 mm long, 1.1 mm diam., glabrous, apices globose. *Fruit* 5-carpellate, 13 mm diam., globose, reddened or tri-coloured, hornless, glabrous, many gland-dotted, apices emarginate. *Seed* 5.5 mm long, 2.5 mm broad, black, shining.

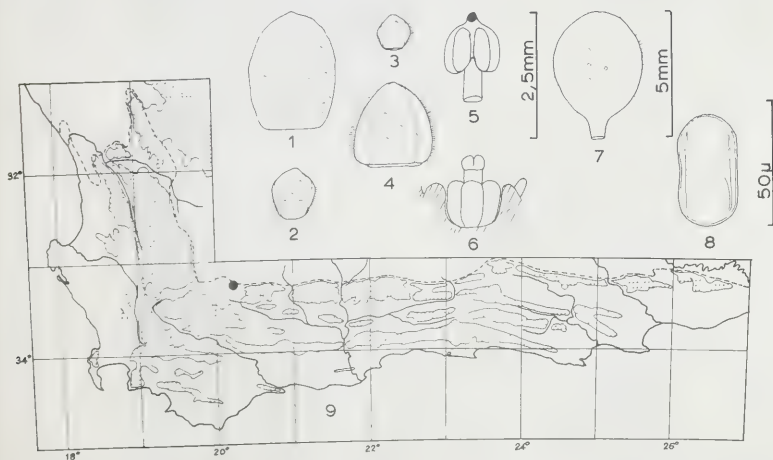


FIG. 8

Acmadenia argillophila: 1, leaf. 2, bract. 3, bracteole. 4, calyx lobe. 5, anther. 6, gynoecium and disc. 7, petal. 8, pollen. 9, distribution.

SPECIMENS EXAMINED

CAPE—3320 (Montagu): 12 miles as the crow flies E. of Touws River, Laingsburg Division (-AC), 3 400 ft., 13/6/1965, *Acocks* 23637 (PRE); about 21 miles N. of Touws River and a few miles S. of Constable, in rhenosterbos veld, in clay soil near a small quarry, Laingsburg Division, 14/9/1971, *Esterhuysen* 32637 (BOL); valley W. of Konstabel, rhenosterveld, rare, straggly bush, 950 m, 14/9/1971, *Thompson* 1230 (STE); Boesmansgat Quarry, 9 km E. of Jan de Boers, Worcester/Laingsburg Division, 1 006 m (3 300 ft.) alt., 3/8/1977, *Williams* 2318 (NBG, BOL, K, MO, PRE).



FIG. 9

Acmadenia argillophila: Flower showing clawed petals and disc with nectar and staminodes.

DISCUSSION

This plant is placed in the genus *Acmadenia* because of having flowers terminal, petals clawed, staminodes present, anther with an apical gland, disc obvallate, stigma capitate, style and filaments short and glabrous, ovary 5-carpellate.

A. argillophila with its branchlets forked at 90°, small thick sessile leaves, lilac flowers 10 mm diam., orbicular petals short-clawed and spreading and with its 5-carpellate globose hornless fruit, is a distinct species. It differs from *A. teretifolia* with terete leaves; from *A. tetracarpellata* with a 4-chambered ovary; from *A. patentifolia* with white flowers and horned fruits; from *A. fruticosa* with petiolate leaves and petals incurved at the throat. It is undoubtedly closest to *A. matroosbergensis*, a rather variable species with similar hornless fruits which has: branchlets densely puberulous; leaves which may be much larger, erect and sparsely ciliolate; buds more acute; petals narrowing evenly to the base with many more gland dots; disc exceeding the ovary closing slightly over it; and staminodes 0,5 mm long, reddened with a minute pointed gland at the apex.

Acmadenia rupicola Williams, sp. nov. propria propter folia in ramulis adultis alterna, antheram glande relative magna conica coronatam post anthesin ad apicem glutinescens.

Frutex 0,25 m altus, ad 0,50 m diam., ad basim monocaulis. *Rami* breves, tenices, patuli, asperi. *Ramuli* breves, erecti, puberuli, tecti. *Folia* (petiolis 1,6 mm longis inclusis) 7,4–8,7 mm longa, 2–2,3 mm lata, oblonga, alterna (vel interdum in ramuli ad basim ad 13 mm longa, 2,4 mm lata, lanceolata, opposita), obtusa, erecta, imbricata, puberula, glanduloso-punctata, costata, marginibus opacis. *Inflorescentia* c. 10 mm diam., solitaria, terminalis, sub-rosea, involucreta. *Bracteae* duae, (petiolis 2,5 mm longis inclusis) 8 mm longae, 1,6–1,7 mm latae, lanceolatae, folia similia. *Bracteolae* duae, 7 mm longae, 1,6 mm latae, ad basim 2 mm petiolatae, ad apex lanceolatae, ad basim oblongae; marginibus ciliolatis, anguste hyalinis, cetera folia similia. *Sepala* quinque, 6–7 mm longa, 1,6–1,8 mm lata, oblonga, sub-acuta, puberula, bifariam glanduloso-punctata, marginibus ad basim ciliolatis, anguste hyalinis. *Petala* quinque, 7–8,3 mm longa, 4–4,9 mm lata, orbicularia, apiculata, sub-rosea, glanduloso-punctata; apex parum ciliolata; unguis 2,5 mm longus, glaber vel ad fauce pubescens, ciliatus, costa incrassata. *Staminodia* quinque, 1 mm long, acicularia. *Fila* quinque, post anthesin 1,6 mm longa, glabra, pallida. *Antherae* quinque, ante anthesin 1,3 mm longae, 0,8 mm latae, glande 0,9 mm longa conica coronatae post anthesin ad apicem glutinescens. *Pollen* 41 μ longum, 34 μ latum, sub-sphaericum. *Discus* obvallatus, ovarium excedens, viridus, nectarifer. *Stigma* 0,6 mm diam., globosum, viridum, capitatum. *Stylus* 1 mm longus, erectus, glaber. *Ovarium* 5-carpellatum, 0,7 mm longum, 0,8 mm diam., apicibus lateralibus sparsim pubescentibus, immerso-glandulosis. *Fructus* 5-carpellatus, 4,9 mm longus, 4 mm diam., involucreatus:

carpella puberula, glanduloso-punctata, cornibus $\pm$ 0,7 mm longis, immerso-glandulosis. *Semen* 3,5 mm longum, 1,5 mm latum, piceum, nitens, paulo nephroideum.

Type: CAPE—3322 (Oudtshoorn): Robinson Pass, south side, Mossel Bay Division (-CC), 850 m (2 800 ft.) alt., 6/12/1977, *Williams 2431* (NBG, holotype).

As far as can be seen, the only time that this plant had been collected was in December 1951 by Miss Elsie Esterhuysen. Fortunately Mr William Bond of Saasveld re-discovered it in December 1977 thus enabling the preparation of this description.

Shrubs 0,25 m tall, spreading up to 0,50 m diam., single-stemmed at base. *Branches* tough, tending to spread; bark rough with leaf scars; annual increments very small. *Branchlets* short, erect, puberulous, hidden by the leaves. *Leaves* (including the petiole 1,6 mm long) 7,4–8,7 mm long, 2–2,3 mm broad, oblong, alternate, 5-ranked, (or on some lower shoots up to 13 mm long, 2,4 mm broad, lanceolate, opposite, decussate), obtuse, erect, imbricate, puberulous, inconspicuously gland-dotted, towards apex triangular in section; midrib prominent; margins opaque. *Inflorescence* about 10 mm diam., solitary, terminal, pale pink, involucre. *Bracts* two (including the petiole 2,5 mm long), 8 mm long, 1,6–1,7 mm broad, lanceolate, otherwise leaf-like. *Bracteoles* two, 7 mm long, 1,6 mm broad, the lower 2 mm recognisable as a petiole, lanceolate above, oblong below with margins ciliate, narrowly translucent; apex slightly reddened, otherwise leaf-like. *Calyx lobes* five, 6–7 mm long, 1,6–1,8 mm broad, in the same flower, oblong, sub-acute puberulous, gland dots in 2 rows, reddened above; margins below ciliate, narrowly translucent; adaxially puberulous below. *Petals* five, 7–8,3 mm long, 4–4,9 mm broad, orbicular, apiculate, minutely ciliate at the apex, gland-dotted, pink, with a short claw about 2,5 mm long, narrowing below, glabrous or pubescent above, margins ciliate, midrib thickened. *Staminodes* five, 1 mm long, acicular, translucent above. *Filaments* five, becoming 1,6 mm long, stout, glabrous, pale. *Anthers* five, 2,2 mm long including a stout, conical, apical gland 0,9 mm long, 0,8 mm broad, becoming sticky at the tip after anthesis. *Pollen* 41 μ long, 34 μ broad, almost spherical. *Disc* obvallate, at first exceeds the ovary equalling the stigma, quite narrow and level above, green, exudes nectar. *Stigma* 0,6 mm diam., globose, green, capitate. *Style* becoming 1 mm long, erect, glabrous. *Ovary* 5-carpellate, 0,7 mm long, 0,8 mm diam., apices sparsely pubescent to either side of an immersed gland, otherwise glabrous. *Fruit* 5-carpellate, 4,9 mm long, 4 mm diam., involucre; *carpels* puberulous, gland-dotted; *horns* c. 0,7 mm long, apical gland large, facing outward. *Seed* 3,5 mm long, 1,5 mm broad, black, shining, somewhat kidney-shaped.

SPECIMENS EXAMINED

CAPE—3322 (Oudtshoorn): Robinson Pass, summit, on rock above road, S.

aspect, Mossel Bay Division (-CC), 2 500 ft., 5/12/1951, *Esterhuysen 19410* (BOL); Robinson Pass, south side, Mossel Bay Division, 850 m (2 800 ft.) alt., 6/12/1977, *Williams 2431* (NBG), 6/6/1978, *Williams 2522* (NBG).

DISTRIBUTION AND BIOLOGY

So far *Acmadenia rupicola* has only been found in one locality, just above the southern summit of the Robinson Pass where there is a rather isolated outcrop of Table Mountain Sandstone forming the spine of a west-facing rocky ridge. Only about nineteen plants were found growing in this area, so it would appear to be a very rare species. The height above sea level is about 850 m (2 800 ft.) and the plants grow in open rocky places that have managed to escape fires and the attentions of the Forestry Department, for many years. Some of them are obviously very old, their age being estimated as well over 20 years. Although this area receives a good annual rainfall yet the plants are not luxuriant. They appear to be struggling to get any nutriment from their roots in the crevices of the rock. Other perhaps more suitable crevices in the rock are mainly colonised by plants of *Erica viridiflora* Andrews. Very few buds, not many flowers and quite a few fruits were seen in December. In June no fruits were seen but two plants were found to be in bloom. The flowers with their fairly large petals and nectariferous disc are most probably insect pollinated and as the plants are single-stemmed at base, it would appear that regeneration can only take place from seed which is dispersed when ripe by the usual catapult mechanism. The leaves when crushed have almost no smell or perhaps they smell faintly of pine tree or resin.

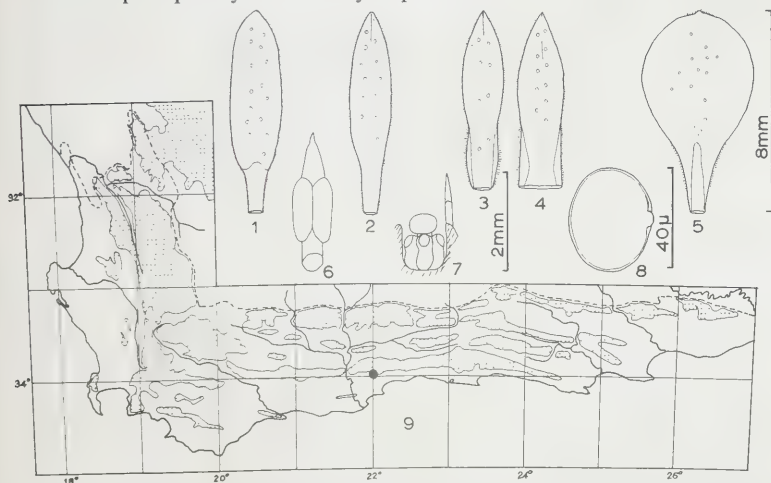


FIG. 10

Acmadenia rupicola: 1, leaf. 2, bract. 3, bracteole. 4, calyx lobe. 5, petal. 6, anther. 7, gynoecium and disc. 8, pollen. 9, distribution.

DISCUSSION

The presence in the flower of anthers bearing a pointed apical gland and of staminodes 1 mm long, places this plant in the genus *Acmadenia*. Other characters which support this and exclude it from other genera of the *Diosmeae* are: (1) flowers terminal, solitary; (2) petals clawed; (3) disc obvallate; exceeds the ovary; (4) stigma capitate; (5) style and filaments short, glabrous; (6) ovary 5-carpellate.

Acmadenia rupicola is a distinct species with alternate leaves, having the anther crowned with a relatively large conical gland which becomes sticky at the tip after anthesis. Only three other members of the genus, *A. niveni* Sond., *A. sheilae* Williams and *A. tetragona* (Linn. f.) B. & W., possess anthers bearing a similar conical gland, however they all have leaves opposite, never alternate.

Acmadenia tenax Williams, sp. nov. propria propter fruticem tenicem scopulophilum glabrum, flores 13 mm diam., petala alba, antheras apicibus globuloso-glandulosis, stylos initio deflexos, fructum glabrum cornibus 3–5 mm longis.

Frutex tenax, ad basim monocaulis, in scopulis crescens. *Rami* effusi, flexisimi. *Ramuli* erectiusculi, graciles, glabri, brevissimi. *Folia* (petiolis 0,8–1 mm longis inclusis) 10–13,5 mm longa, 1,3–1,7 mm lata, lineari-lanceolata, acuta, alterna, erecto-patentia, recurviuscula, creba, glabra, glanduloso-punctata; apex obtuse mucronulata; marginibus irregulariter serrulatis vel denticulatis, anguste cartilagineis. *Inflorescentia* 13 mm diam., solitaria, terminalis, sessilia, alba. *Bractea* 1,6 mm longa, 0,6 mm lata, lanceolata, digito-apiculata, ciliata, 2–3 glanduloso-punctata, intus pubescentia. *Bracteolae* duae, 1,4 mm longae, 0,6 mm latae, ovatae, ciliatae, 1–2 glanduloso-punctatae, subacutae, intus sparsim pubescentes, marginibus late hyalinis. *Sepala* quinque, 3 mm longa, 1,5 mm lata, deltoidea, erecta, intus pubescentia, glanduloso-punctata, marginibus ciliatis, late hyalinis. *Petala* quinque, 7–9 mm longa, 4–4,5 mm lata, alba, glabra; *limbus* recurvus, obovatus, extus glanduloso-punctatus, marginibus sparsim ciliatis; unguis c. 2 mm longus. *Staminodia* quinque, c. 1 mm longa, glandulosa, glabra. *Filamenta* quinque, post anthesin 2,5 mm longa, patentia, glabra, acicularia. *Antherae* quinque, ante anthesin 1,2 mm latae, 0,8 mm longae, flavidae, glandula globosa coronata. *Pollen* 53 μ longum, 27 μ latum ellipticum. *Discus* obvallatus, ovarium excedens, nectarifer. *Stigma* 0,25 mm diam., capitellatum. *Stylus* primus deflexus deinde erectus, 2 mm longus, glaber, persistens. *Ovarium* 5-carpellatum, glabrum, apicibus globosis. *Fructus* 5-carpellatus, 9–11 mm longus, c. 6 mm diam., glaber, minute glanduloso-punctatus, forte nervatus; *cornua* 3–5 mm longa, erectiuscula. *Semen* 4–5 mm longum, 1,75 mm latum, piceum, nitens.

Type: CAPE—3319 (Worcester): uppermost left hand fork of Jan du Toit's Kloof, Hex River Mountains, near Mount Brodie, Worcester Division (-AD/CB), 1 646 m (5 400 ft.) alt., 18/2/1978. *Esterhuysen* 34852 (BOL, holotype; E, K, L, LD, M, MO, NBG, PRE, S, isotypes).

In January, 1949 Miss Elsie Esterhuysen gathered this plant whilst climbing

with a party up the ledges and steep rocky slopes at the head of Jan du Toit's Kloof in the Waaihoek Mountains. Now, almost thirty years later, she most kindly consented to endeavour to rediscover it so that it could be described. This time, instead of climbing up by way of Jan du Toit's Kloof, she thought it might be easier to ascend via the path to the University ski hut in the Waaihoek Mountains and then to traverse across to Perry Refuge which is relatively close to Mount Brodie. She was accompanied by Mr Reiger van der Vlugt and Mr David Morrison and the expedition, which took three days, was most successful. The information and material collected has been used as a basis for this description and also for a study of its chemical components by Dr Peter Waterman of the University of Strathclyde in Glasgow.

Shrubs about 0,3 m tall, sometimes creeping about 2 m along ledges, growing from a single stem at base, firmly rooted in crevices in the cliff face. *Branches* tough, sprawling or hanging down, bent at all angles, with a dark brown rough bark. *Branchlets* fairly erect, slender, glabrous, very short, somewhat hidden by the leaves. *Leaves* 10–13,5 mm long (including the petiole 0,8–1 mm long), 1,3–1,7 mm broad, linear-lanceolate, acute, alternate, spreading-erect, somewhat recurved, crowded, glabrous; apex with a small blunt mucro; margins irregularly and minutely serrulate or denticulate, narrowly cartilaginous; adaxial surface smooth and flat when fresh; abaxial surface rounded with two rows of gland dots to either side of the midrib. *Inflorescence* 13 mm diam., solitary, terminal, sessile, white. *Bract* 1,6 mm long, 0,6 mm broad, lanceolate-apiculate with a finger-like tip, ciliate, glabrous with 2–3 gland dots on the midrib, adaxially pubescent. *Bracteoles* two, 1,4 mm long, 0,6 mm broad, ovate, sub-acute with a blunt apex, ciliate with broad translucent margins, glabrous with 1–2 gland dots towards the midrib, adaxially very sparsely pubescent. *Calyx lobes* five, 3 mm long, 1,5 mm broad, deltoid with a blunt point, glabrous, gland-dotted to either side of the midrib, erect; adaxially pubescent; margins ciliate, broadly translucent. *Petals* five, 7–9 mm long, 4–4,5 mm broad, white, glabrous, clawed; *limb* recurved, obovate, margins with one or two minute cilia, abaxially gland-dotted; *claw* about 2 mm long narrowing to the base. *Staminodes* five, about 1 mm long, pale, glabrous, apex with a somewhat pointed gland. *Filaments* five, becoming 2,5 mm long after anthesis, spreading, glabrous, acicular, pale. *Anthers* five, before anthesis 1,2 mm long, 0,8 mm broad, yellow with a sessile, globose apical gland. *Pollen* 53 μ long, 27 μ broad, elliptic. *Disc* obovate, rather narrow, more or less level on top, greenish, exceeds the ovary, exudes nectar. *Stigma* 0,25 mm diam., capitellate, green. *Style* deflexed at first becoming 2 mm long, erect, glabrous, persisting. *Ovary* 5-carpellate, glabrous, apices globose. *Fruit* (from Esterhuysen 15080) 5-carpellate, 9–11 mm long, about 6 mm diam.; *carpels* glabrous, strongly veined when dry, minutely gland-dotted; *horns* 3–5 mm long, fairly erect, each with an immersed apical gland. *Seed* (from Esterhuysen 15080) 4–5 mm long, 1,75 mm broad, black, shining.

SPECIMENS EXAMINED

CAPE—3319 (Worcester): uppermost left hand fork of Jan du Toit's Kloof, Hex River Mountains, near Mount Brodie, Worcester Division (-AD/CB), 1 646 m (5 400 ft.) alt., 18/2/1978, *Esterhuysen 34852* (BOL, E, K, L. LD, M, MO, NBG, PRE, S); ledges and steep rocky slopes at head of Jan du Toit's Kloof, Waaihoek Mountains, Worcester Division, 4 500 ft. alt., 22/1/1949, *Esterhuysen 15080* (BOL).

DISTRIBUTION AND BIOLOGY

So far *Acmadenia tenax* has been found only in one locality at the head of Jan du Toit's Kloof in the Hex River Mountains. The plants are very firmly rooted in horizontal crevices in almost vertical cliffs of Table Mountain Sandstone. Mostly facing south, they receive very little sunlight. The plants are spaced about three metres apart and there are no plants amongst the vegetation at the base of the cliff. The plants appear to be inaccessible to fires and are quite old. One branch about 1,25 m long and 19 mm diameter showed about 68 rings and at least 43 annual increments in length. It was sprawling along a ledge. Plants were seen with stems up to about 40 mm diameter which could therefore have been about 190 years old. The conspicuous petals, the at first deflexed style and the presence of nectar indicate that this plant is insect pollinated. Seeds when ripe are ejected by the usual catapult mechanism and, when one considers the locality, just how regeneration can take place remains a mystery.

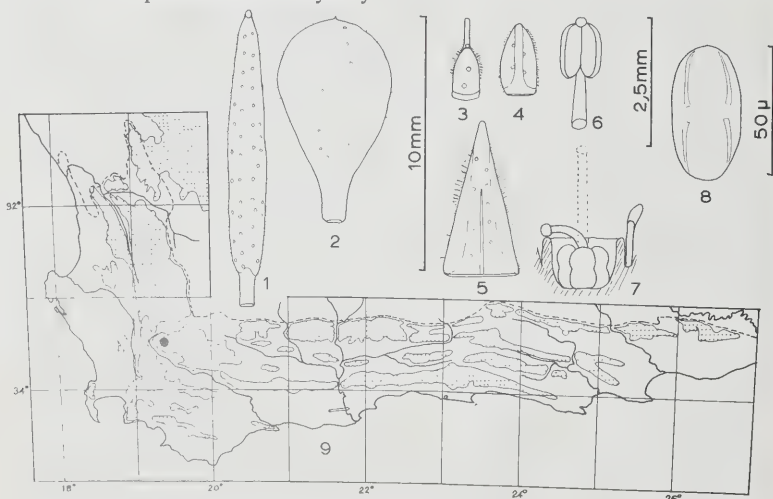


FIG. 11

Acmadenia tenax: 1, leaf. 2, petal. 3, bract. 4, bracteole. 5, calyx lobe. 6, anther. 7, gynoecium and disc. 8, pollen. 9, distribution.

DISCUSSION

In placing this plant in the genus *Acmadenia* one takes account of the following characters some or all of which exclude it from all other genera of the *Diosmeae*: (1) *flowers* solitary, terminal; (2) *petals* clawed; (3) *staminodes* 1 mm long tipped with a gland; (4) *filaments* and *style* glabrous and short equalling the claws; (5) *anthers* with a small sessile apical gland; (6) *disc* obvallate, exceeds the ovary but does not close over it; (7) *stigma* capitellate; (8) *ovary* 5-carpellate.

Acmadenia tenax is recognised as distinct because of being a tough, glabrous plant growing on cliffs, with large white flowers, having anthers with a small sessile globose apical gland and a style at first deflexed, the fruit glabrous with horns 3–5 mm long. Only three other species of *Acmadenia* have the style deflexed at first, *A. teretifolia*, *A. tetracarpellata* and *A. wittebergensis*, but all of these have fruits with truncated or very short horns. Of all the species of *Acmadenia* with white flowers, *A. tenax* has the largest petals.

Diosma arenicola Williams, sp. nov. propria propter folia lanceolata pungentia crispo-ciliata costis sparsim pubescentibus, bracteolas 4 mm longas lineares crispo-ciliatas costis pubescentibus.

Frutex ad 1,5 m, ad basim monocaulis. *Rami* erectiusculi, varie flexi, glabrescenti. *Ramuli* numerosi erecti, brevi, graciliusculi, dense pubescenti. *Folia* variantes, ad 17 mm longa, 3,3 mm lata, opposita, in juvenibus; 5,5–10,5 mm longa, 2,4 mm lata, alterna, in adultis, lanceolata, pungentia, breve petiolata, erecto-patentia, glanduloso-punctata, costis sparsim pubescentibus, marginibus hyalinis crispo-ciliatis. *Inflorescentia* 1–4 nata, crebra, terminalis; *flos* 8 mm diam., patens, album. *Bractea* 5–6 mm longa, 1–2 mm lata, linearis vel lanceolata, rubro-pungentia, glabra vel ad costam sparsim pubescentia, eglandulosa, marginibus hyalinis crispo-ciliatis. *Bracteolae* duae, 4–4,3 mm longae, 0,6 mm latae, lineares, crispo-ciliatae, costis pubescentibus. *Sepala* quinque, 3,5–4 mm longa, 1,5–1,7 mm lata, deltoidea, pungentia, costis ad basim sparsim pubescentibus, marginibus late hyalinis crispo-ciliatis. *Petala* quinque, 3–3,6 mm longa, 1,8–2,3 mm lata, elliptica, recurvo-apiculata, glabra, alba, sparsim ciliata, sessilia. *Staminodia* carentia. *Filamenta* quinque, post anthesin 2,2 mm longa, acicularia, glabra, pallida, patentia. *Antherae* ante anthesin 1,4–1,6 mm longae, 0,8 mm latae, aurantiacae vel vinosae, apicibus semi-immerso-glandulosi. *Pollen* 66 μ longum, 28 μ latum, oblongum. *Discus* 2,5 mm diam., patens, 5-sinuato-crenulatus, crassus, pallenti-viridis, nectarifer, ovarium longe excedens. *Stigma* 0,25 mm diam., capitellatum, pallenti-viride. *Stylus* 1,3 mm longus, glaber, per anthesin deflexus, persistens. *Ovarium* 5-carpellatum, 0,8 mm longum, 0,7 mm diam., glabrum, apicibus globosis. *Fructus* 5-carpellatus, 9 mm longus, 7 mm diam., glaber, oleosus, multi-glanduloso-punctatus; *cornibus* c. 2 mm longis, erectis. *Semen* (cum arilo) 5,5 mm longum, 2,6 mm latum, piceum, nitens.

Type: CAPE—3419 (Caledon): Soetanytsberg above the farm Hangnes, Bredasdorp

Division (-DB), 180 m (600 ft.) alt., 25/5/1978, *Williams 2507* (NBG, holotype; BOL, K, MO, PRE, S, isotypes).

Diosma arenicola appears to have been first collected by H. Bolus in July 1895 "in hills near Bredasdorp". Towards the end of the next year he collected it again "in hills (at) Rietfontein Poort near Elim"; a place in the Soetansysberg very near to the type locality. Schlechter's collection no. 7713 rather vaguely labelled "Elim 300 ft." undoubtedly comes from the same area. Schlechter distributed duplicates of his 7713 to many herbaria.

Shrubs to 1,5 m tall, arising from a single stem at base. *Branches* fairly erect, variously bent, glabrescent; *bark* brown, somewhat roughened with leaf scars. *Branchlets* numerous, erect, short, fairly slender, densely pubescent, pale green, partly visible between the leaves. *Leaves* variable in size, in young plants up to 17 mm long, 3,3 mm broad, opposite; in mature plants 5,5–10,5 mm long, 2,4 mm broad, alternate, lanceolate, pungent, short-petiolate, spreading-erect; midrib sparsely pubescent, gland-dotted to either side; margins crisped ciliate, translucent. *Inflorescence* 1–4 nate, terminal, crowded; *flower* 8 mm diam., white, spreading. *Bract* 5–6 mm long, 1–2 mm broad, linear or lanceolate, red pointed, glabrous or sparsely pubescent along the midrib, without gland dots, margins shaggy ciliate, translucent. *Bracteoles* two, 4–4,3 mm long, 0,6 mm broad, linear, midrib pubescent, margins shaggy ciliate. *Calyx lobes* five, 3,5–4 mm long, 1,5–1,7 mm broad, deltoid, pungent; midrib sparsely pubescent below; margins broadly translucent, crisped ciliate. *Petals* five, 3–3,6 mm long, 1,8–2,3 mm broad, elliptic, recurved-apiculate, glabrous, sparsely ciliate, sessile. *Staminodes* absent. *Filaments* five, becoming 2,2 mm long, acicular, glabrous, pale, spreading. *Anthers* before anthesis 1,4–1,6 mm long, 0,8 mm broad, orange or purplish; apical gland globose, semi-immersed. *Pollen* 66 μ long, 28 μ broad, oblong. *Disc* 2,5 mm diam., opens widely, 5-sinuate-crenulate, thick, pale green, exudes nectar, exceeds the ovary by a long way. *Stigma* 0,25 mm diam., capitellate, pale green. *Style* becoming 1,3 mm long, deflexed at anthesis, persisting, glabrous. *Ovary* 5-carpellate, 0,8 mm long, 0,7 mm diam., glabrous, apices globose. *Fruit* 5-carpellate, 9 mm long, 7 mm diam., glabrous, oily, multi-gland-dotted, veined when dry; *horns* about 2 mm long, erect, red tipped with an immersed gland. *Seed* (including the aril) 5,5 mm long, 2,6 mm broad, black, shining.

SPECIMENS EXAMINED

CAPE—3419 (Caledon): Groothagelkraal, limestone hills, Bredasdorp Division (-DA), 400 ft., 24/4/1978, *Williams 2482* (NBG); Groothagelkraal River area, N.E. of farmstead, limestone slopes, Bredasdorp Division, 300 ft., 28/4/1975, *Oliver 5889* (STE); Hagelkraal, limestone hills, Bredasdorp Division, 28/12/1946, *Compton 19037* (BOL, NBG); Hagelkraal River, limestone hills, Bredasdorp Division, 27/12/1946, *Leighton 2542* (PRE, BOL); Limestone hills

2–3 miles inland from Pearly Beach, Bredasdorp Division, 7/10/1972, *Esterhuysen* 32978 (BOL); Soetanyberg above the farm Hangnes, Bredasdorp Division (-DB), 180 m, 25/5/1978, *Williams* 2507 (NBG, BOL, K, MO, PRE, S); Elim, Bredasdorp Division, 300 ft., 24/4/1896, *Schlechter* 7713 (BM, BOL, G, GRA, K, P, PRE, S); In collibus Rietfontein Poort prope Elim, Bredasdorp Division, 200 ft., 10/12/1896, *H. Bolus* 8530 (BOL, K, NBG); Uintjieskuil, limestone hills, Bredasdorp Division, 200 ft., 16/1/1968, *Van Breda and Admiraal* 2330 (PRE); Brandfontein, about $\frac{3}{8}$ mile from the sea, Bredasdorp Division (-DD), 70 ft., 11/1/1972, *Williams* 1620 (NBG); Brandfontein, S. side of ridge on top of hills, Bredasdorp Division, 14/10/1951, *Esterhuysen* 19059 (BOL, LD, PRE); Side of Wolwekloof on S. slope of Soetanyberg, Bredasdorp Division, 100 ft., 16/11/1927, *Smith* 5030 (K, PRE); In Wolwekloof, Bredasdorp Division, 75 ft., 16/10/1927, *Smith* 5015 (PRE).

—3420 (Bredasdorp): In collibus prope Bredasdorp (-CA), 300 ft., -/7/1895, *H. Bolus* 8475 (BOL); 6 miles S.W. of Bredasdorp, fynbos on limestone slope, 200 ft., 25/9/1949, *Acocks* 15467 (K, PRE); Cape Agulhas, in sand at base of hills, Bredasdorp Division (-CC), 18/9/1962, *Esterhuysen* 29694 (BOL, PRE, S); Struisbaai, Bredasdorp Division, 50 ft., 21/6/1972, *Williams* 1657 (NBG, PRE); Northumberland Point, Bredasdorp Division, 20 ft., 25/8/1962, *Acocks* 22629 (K, PRE).

DISTRIBUTION AND BIOLOGY

Diosma arenicola is found in sandy soil closely associated with limestone deposits of the Bredasdorp geological series. Its distribution extends from near Bredasdorp in the east to Hagelkraal in the west, all within a few kilometres of the sea coast. Further towards the east its particular habitat is taken over by *Diosma sabulosa* which extends as far as Albertinia. From Hagelkraal towards the west *Diosma subulata* and *Diosma awilana* occupy a similar habitat. A section through the stem of one plant, 17–22 mm diameter, showed about 11 growth rings. The open white flower with its nectariferous disc and, at first, deflexed style is most probably pollinated by insects. Being single-stemmed at base, and thus unable to coppice after fires, regeneration can only take place from seed which is ejected in the usual way by a catapult mechanism.

Flowers have been found in almost every month of the year. Fruiting has been observed from May to December.

VARIATION

Plants from the eastern end of the distribution range may have the midrib of the leaf, bract, bracteole and calyx lobes glabrous whilst still remaining very plainly crisped ciliate.

DISCUSSION

The white flower with its spreading sessile petals and open sinuate-crenulate

disc, exceeding the ovary by a long way, immediately places this plant in the genus *Diosma*.

Diosma arenicola is a distinct species with leaves lanceolate with a straight sharp point, with margins crisped ciliate and with the midrib often sparsely pubescent; with bracteoles 4 mm long, linear, crisped ciliate and pubescent along the midrib; and with flowers crowded and sessile. It differs from *D. awilana* which has leaves much broader and more recurved at the apex, bracteoles much less hairy and only half as long and fruits with much longer horns. It is closest to *D. subulata* which however is a much more glabrous plant with bracts, bracteoles and calyx lobes short-ciliate not long crisped-ciliate and with flowers in very much reduced racemes not crowded and sessile.

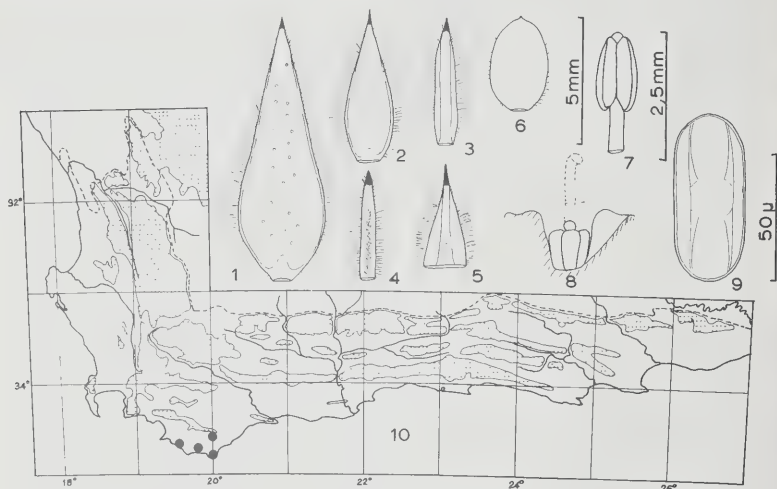


FIG. 12

Diosma arenicola: 1, leaf. 2, outer bract. 3, inner bract. 4, bracteole. 5, calyx lobe. 6, petal. 7, anther. 8, gynoecium and disc. 9, pollen. 10, distribution.

Diosma haelkraalensis Williams, sp. nov. propria propter fruticem decumbentem, ramulos brevissimos, folia recurvopatentia parva, flores parvos albos.

Frutex 0,10–0,30 m altus, decumbens, tegetes c 1 m diam. formantes. *Rami* tenices, decumbentes, flexissimi; cortex aspra. *Ramuli* brevi, erectiusculi, glabri vel minute puberuli, pallidi, eglandulosi. *Folia* 3,8–4,2 mm longa, 1,8–2,2 mm lata, ovato-lanceolata, obtusa vel sub-acuta, mucronulata, glabra, glanduloso-punctata, sessilia, opposita, ternata, patentia vel recurva, marginibus anguste hyalinis, glanduloso-punctatis, serrulatis, ad basim sparsim setulosis. *Inflorescen-*

tia terminalis, solitaria vel bini, 5–5,5 mm diam., alba; *calyx* laevigatus. *Bractea* 1,5 mm longa, 1 mm lata, ovato-lanceolata, obtusa, glabra, marginibus late hyalinis, ciliolatis. *Bracteolae* duae, 1,2 mm longae, 1 mm latae, ovatae, obtusae, glabrae, marginibus minute ciliolatis, anguste hyalinis. *Sepala* quinque, 1,7 mm longa, 1,2 mm lata, deltoidea, glabra, apicibus incrassatis, marginibus ad basim late hyalinis, ciliolatis. *Petala* quinque, 2,2–2,3 mm longa, 1,5 mm lata, ovata, glabra, alba, patentia, sessilia. *Staminodia* quinque, vestigialia. *Filamenta* quinque, post anthesin 1,8 mm longa, glabra. *Antherae* quinque, ante anthesin 1,3 mm longae, 0,8 mm latae, glandula semi-immersa coronata. *Pollen* 50 μ longum, 25 μ latum, ellipticum. *Discus* patens, ovarium excedens, margine carnosus, virido, sinuato-crenulato, nectarifero. *Stigma* 0,25 mm diam., globosum, capitellatum. *Stylus* glaber, ab initio deflexus deinde erectus, 1,5 mm longus. *Ovarium* 5-carpellatum, 0,6 mm longum, 0,7 mm diam., glabrum, apicibus spiculatis. *Fructus* 5-carpellatus, 7–8 mm longus, 5,5 mm diam., glaber, cornibus c. 3 mm longis, sparsim setulosis, obtusis, sub-emarginatis. *Semen* 3,5–4 mm longum, 1,6–2 mm latum, piceum, nitens.

Type: CAPE—3419 (Caledon): 2 km E.N.E. of Groothagelkraal, Bredasdorp Division (-DA), 110–170 m (350–550 ft.) alt., 24/4/1978, *Williams 2486* (NBG, holotype; K, MO, PRE, S, isotypes).

As recently as October 1972 Miss Elsie Esterhuysen made a collection of this species. She discovered it growing on limestone hills between one and two miles inland from Pearly Beach to the western end of the Bredasdorp Division. Although several other botanists had previously made collections in this area, it seems to have been overlooked by all of them. More recently in April 1975 it was found in more or less the same area by E. G. H. Oliver.

Shrubs 0,10–0,30 m tall, decumbent, 1 m diam., forming dense mats. *Branches* tough, prostrate, bent at all angles; bark rough. *Branchlets* short, sub-erect, glabrous or minutely puberulous, pale, shining without any gland dots, well-clothed with leaves, but not hidden. *Leaves* 3,8–4,2 mm long, 1,8–2,2 mm broad, ovate-lanceolate, obtuse or sub-acute with a small blunt mucro, glabrous, gland-dotted towards midrib and margins, sessile, opposite, ternate, spreading or reflexed and somewhat recurved; margins narrowly translucent, serrulate-denticulate to setulose towards the base. *Inflorescence* terminal, solitary or twin, 5–5,5 mm diam., white; *calyx* glabrous, shining. *Bract* 1,5 mm long, 1 mm broad, ovate-lanceolate with a blunt point, glabrous, spreading; margins below ciliolate and broadly translucent. *Bracteoles* two, 1,2 mm long, 1 mm broad, ovate, obtuse, glabrous; margins minutely ciliolate, narrowly translucent. *Calyx lobes* five, 1,7 mm long, 1,2 mm broad, deltoid, glabrous; apex thickened, somewhat recurved; margins below ciliolate and broadly translucent. *Petals* five, 2,2–2,3 mm long, 1,5 mm broad, ovate, somewhat thickened at the tip, glabrous, white, sessile, spreading. *Staminodes* five, an immersed vestigial gland at the

summit of the lobe of the disc very close to the base of the petal. *Filaments* five, acicular, glabrous, becoming 1,8 mm long after anthesis. *Anthers* five, before anthesis 1,3 mm long, 0,8 mm broad, dorsally somewhat pink, yellow in front; apical gland globose, semi-immersed. *Disc* stands open, exceeds the ovary by a long way; margin sinuate-crenulate, fleshy, dark green, exudes nectar. *Stigma* 0,25 mm diam., globose, capitellate. *Style* deflexed at first, becoming 1,5 mm long, glabrous. *Ovary* 5-carpellate, 0,6 mm long, 0,7 mm diam., glabrous with the apices roughened with a dense layer of minute conical points (spiculate). *Fruit* (from *Williams* 2503) 5-carpellate, 7–8 mm long overall, 5,5 mm diam., glabrous; *horns* about 3 mm long, sparsely and minutely setulose above; apices obtuse sub-emarginate with an immersed gland. *Seed* 3,5–4 mm long overall, 1,6–2 mm broad, black, shining.

SPECIMENS EXAMINED

CAPE—3419 (Caledon): 2 km E.N.E. of Groothagelkraal, Bredasdorp Division (-DA), 110–170 m (350–550 ft.) alt., 24/4/1978, *Williams* 2486 (NBG, K, MO, PRE, S); Groothagelkraal, N.E. of farmstead, Bredasdorp Division, 300 ft., alt., 28/4/1975, *Oliver* 5890 (STE); Limestone hills 1–2 miles inland from Pearly Beach, Bredasdorp Division, 8/10/1972, *Esterhuysen* 32983 (BOL).

DISTRIBUTION AND BIOLOGY

Diosma haelkraalensis appears to be confined to a small group of limestone hills, not more than 2,5 km long, situated about 2 km to the north east of Groothagelkraal homestead. It grows in crevices upon and amongst limestone rocks of the Bredasdorp geological formation in what must be a very harsh environment. The plants are found at altitudes of between 100 and 200 metres above sea level, pressed down by the prevailing winds and spreading out to form dense mats up to 1 m diameter. A section of the stem of one plant about 22 m diameter showed about 30 growth rings. The small open white flower with its nectariferous disc and, at first, deflexed style is most probably pollinated by insects. Regeneration is from seed which is ejected when ripe by the usual catapult mechanism. The leaves when crushed have a very strong smell, much stronger than those of *Diosma guthriei* which is obviously a very closely related species also associated with the limestone but found about 30 kilometres further to the east.

DISCUSSION

The white flower with its spreading sessile petals and the open disc, exceeding the ovary by a long way with its fleshy, sinuate-crenulate margin immediately places this plant into the genus *Diosma*.

Diosma haelkraalensis with its decumbent habit, very short branchlets, small somewhat recurved leaves and small white flowers is a distinct species. It is one of

a series of four very similar and quite possibly vicarious taxa which are found growing on the limestone more or less along the coast from Walker Bay in the west to about Still Bay in the east. The others are *D. demissa* Williams which differs in having leaves alternate, obtuse with a single row of gland dots along the midrib; *D. guthriei* Glover which differs in having leaves ovate, often opposite, more erect and thicker with margins not translucent; and *D. echinulata* Williams, which differs in having leaves alternate, lanceolate-elliptic, mucronate and sparsely setose on all sides.

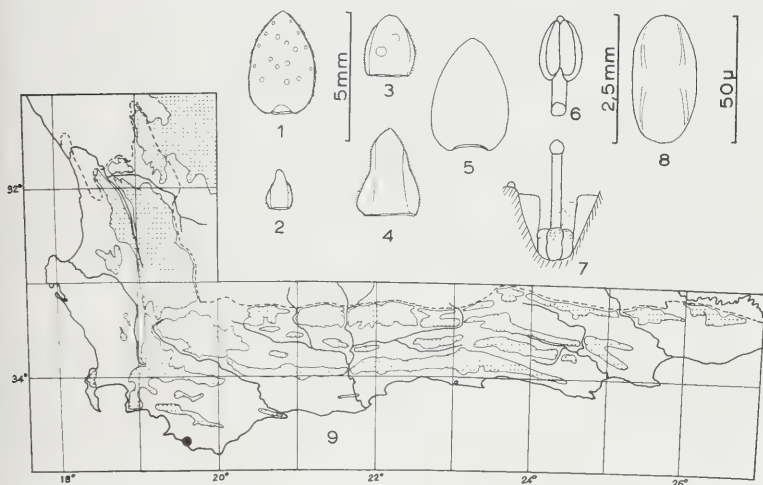


FIG. 13

Diosma haelkraalensis: 1, leaf. 2, bract. 3, bracteole. 4, calyx lobe. 5, petal. 6, anther. 7, gynoecium and disc. 8, pollen. 9, distribution.

***Diosma pedicellata* Williams, sp. nov.** propria propter fruticem altum rigidum ramosum ad basin multi-caulem, folia petiolata recti-mucronata anguste costata, flores 7 mm diam. calycibus glabris et lobis obtusis, petala patentia glabra peranguste connexa marginibus irregularibus, fructum supra calycem pedicellascens.

Frutex c. 1 m altus, rigidus, ramosus, ad basin multicaulis. *Rami* erecti, rigidi, furcati, glabri. *Ramuli* erecti, graciles, nunquam numerosi, sub-dichotomi, glabrescenti. *Folia* (petiolis 1 mm longis inclusis) 8–12,5 mm longa, 0,8–1 mm lata, lineari-lanceolata, acuta, recti-mucronata, glabra, glanduloso-punctata, alterna, erecto-patens, marginibus anguste hyalinis, sparsim serrulatis. *Inflorescentia* terminalia, solitaria vel pseudo-bini, reducto-racemosa; *flos* 7 mm diam. *Bractea* 1 mm longa, 0,7 mm lata, late-lanceolata, acuta, mucronulata, glabra, sparsim

glanduloso-punctata, marginibus hyalinis minute ciliolatis. *Bracteolae* duae, 0,8 mm longae, 0,7 mm latae, ovatae, minute apiculatae, sparsim glanduloso-punctatae, marginibus hyalinis minute ciliolatae. *Sepala* quinque, 1,3 mm longa, 1,5 mm lata, late ovata, obtusa, glabra, sparsim glanduloso-punctata, apicibus incrassatis, marginibus hyalinis minute ciliolatis. *Petala* quinque, 2,5 mm longa, 1,8 mm lata, late elliptica, glabra, alba, sessilia, patentia, marginibus irregulariter ciliato-denticulata. *Staminodia* 0. *Filamenta* quinque, post anthesin 1,7 mm longa, acicularia, glabra, patentia. *Antherae* quinque, ante anthesin, 0,9 mm longae, 0,8 mm latae, flavidae, glandula sessilia coronata. *Pollen* 51 μ longum, 29 μ latum, ellipticum. *Discus* 5-lobatus, sinuatus, patens, viridus, succulentus, minute punctulatus, ovarium longe excedens. *Stigma* 5-lobatum, 0,2 mm diam., capitellatum. *Stylus* primus deflexus deinde erectus 1,3 mm longus, glaber. *Ovarium* 5-carpellatum, 0,7 mm diam., glabrum, apicibus globosis. *Fructus* 5-carpellatus, 1,2 mm longus, 0,8 mm diam., glaber, glanduloso-punctatus, ad maturitatem supra calycem pedicellatus. *Semen* c. 7 mm longum, 3 mm latum, piceum, nitens; arilus pro parte maxima piceus.

Type: CAPE—3218 (Clanwilliam): 6 km north of Papkuilsfontein, near Aurora, Piquetberg Division (-CB), 76 m (250 ft.) alt., 11/8/1977, *Williams* 2328 (NBG, holotype; K, MO, PRE, isotypes).

Diosma pedicellata, was apparently first collected by C. P. Thunberg. In 1744, when at the Cape of Good Hope, his route on the way to the Roggeveld must have passed through the sandy plains to the south and west of the Picketberg where this plant is abundant. It is apparent from the specimens in Thunberg's herbarium that he considered it, as well as two other species collected elsewhere, to be conspecific with *Diosma rubra* L. (= *Coleonema rubrum* (L.) Druce). Ecklon and Zeyher, who collected this plant near Tulbagh, misidentified it as 845 *Diosma linearis* Thunb. and again as 846 *Diosma longifolia* Wendl. Drège also collected this plant but failed to cite it in his "Documente". Sonder considered it to be a variety of *Diosma aspalathoides* Lam. with longer leaves. At a first glance, herbarium material of this plant looks rather like *D. hirsuta* and it was only the appearance of the fruits which are pedicellate above the calyx in Drège's specimen in the herbarium at Kew Gardens that drew my attention to it as being unique.

Shrubs about 1 m tall, rigid, much-branched, many-stemmed with a stout rootstock. *Branches* erect, rigid, glabrous, forked; bark reddish-brown becoming ashy-grey with leaf scars slightly raised. *Branchlets* erect, slender, not very numerous, not hidden by the leaves, sub-dichotomous, soon glabrous. *Leaves* (including the petiole 1 mm long) 8–12,5 mm long, 0,8–1 mm broad, linear-lanceolate, acute, glabrous, alternate, erect-spreading; apex mucronate with a straight point; margins narrowly hyaline, sparsely serrulate; abaxial surface rounded with gland dots scattered to either side of the midrib; adaxial surface concave. *Inflorescence* terminal, solitary or pseudo-twin in slender reduced

racemes; flowers 7 mm diam., opening in succession, delapsing if infertile. *Bract* 1–2 mm long, 0,7 mm broad, broadly lanceolate, acute, mucronate, glabrous, sparsely gland-dotted; margins minutely ciliate. *Bracteoles* two, 0,8 mm long, 0,7 mm broad, ovate, minutely apiculate, sparsely gland-dotted; margins minutely ciliate, translucent. *Calyx lobes* five, 1,3 mm long, 1,5 mm broad, broadly ovate, obtuse, glabrous, sparsely gland-dotted; apex thickened; margins minutely ciliate, translucent. *Petals* five, 2,5–3 mm long, 1,8–2,5 mm broad, orbicular, white, glabrous, sessile, spreading, arising high up on the lobe of the disc; margins ciliate-denticulate, irregular. *Staminodes* none. *Filaments* five, becoming 1,7 mm long after anthesis, acicular, spreading, glabrous. *Anthers* five, before anthesis 0,9–1,1 mm long, 0,8 mm broad, yellow, apical gland sessile, inclined inwards. *Pollen* 51 μ long, 29 μ broad, elliptic, many malformed. *Disc* 5-lobed, sinuate, green, fleshy, minutely punctate, spreading, exceeding the ovary by a long way. *Stigma* 0,2–0,4 mm diam., capitellate, green. *Style* becoming 1,3–1,7 mm long, glabrous, deflexed at first. *Ovary* 5-carpellate, 0,7 mm diam., glabrous, lobes obtuse. *Fruit* 5-carpellate, 1,2 mm long overall, 0,8 mm diam., glabrous, pitted with gland dots, becoming $\pm$ 2,5 mm pedicellate above the calyx when mature; *horns* $\pm$ 5 mm long, spreading at 45°. *Seed* $\pm$ 7 mm long, 3 mm broad, black, shining; aril for the most part black.

SPECIMENS EXAMINED

CAPE—3119 (Calvinia): at Kaisersfontein turn off from main van Rhynsdorp-Nieuwoudtville road (-AC), 26/8/1976, *Goldblatt* 3966 (MO).

—3218 (Clanwilliam): Nardouw Kloof, Clanwilliam Division (-BB), -/9/1947, *Stokoe s.n.* (SAM 64121); 6 km north of Papkuilsfontein, near Aurora, Piquetberg Division (-CB), 76 m (250 ft.) alt., 11/8/1977, *Williams* 2328 (NBG, K, MO, PRE), 16/11/1977, *Williams* 2393 (NBG, K, PRE, MO, S); 1,6 km south of Aurora turn off, Piketberg Division, 300 ft. alt., 16/11/1977, *Williams* 2394 (NBG, BOL, MO, PRE); near Sauer, Piquetberg Division (-DC), 6/11/1963, *Esterhuysen* 30527 (BOL), 10/9/1944, *Steyn* 549 (NBG), -/10/1943, *Compton* 15097 (NBG).

—3219 (Wupperthal): on the road from Citrusdal to the Cold Bokkeveld near Allandale, Clanwilliam Division (-CA), 1 950 ft. alt., 7/11/1974, *Williams* 1920 (NBG); Thee Rivier Kloof, 15 miles S. of Citrusdal, Clanwilliam Division, -/4/1949, *Stokoe s.n.* (SAM 64139).

—3318 (Cape Town): Darling along the Bokbaai Road, Malmesbury Division (-AD), -/9/1940, *Esterhuysen* 4860 (BOL); between Mamre and Ysterfontein, Malmesbury Division, -/8/1931, *L. Bolus s.n.* (BOL 21297); near Ysterfontein, Malmesbury Division, -/7/1938, *Esterhuysen* 2775 (BOL); Tiny Vorster Nature Reserve, Darling, Malmesbury Division, 380 ft. alt., 6/12/1977, *Williams* 2409 (NBG); Darling, Malmesbury Division, 23/8/1947, *Compton* 19887 (NBG); Darling Flora Reserve, Malmesbury Division, 24/7/1956, *Winkler* 111 (NBG);

Malmesbury (-BC), 28/9/1943, *Compton 14987* (NBG); banks of Berg River near Gouda in sand, Tulbagh Division (-BD), 25/5/1952, *Esterhuysen 20161* (BOL, LD); Kalabaskraal, Malmesbury Division (-DA), 27/7/1971, *Negin 26* (NBG); in hard sandy soil between Klipheuwel and Durbanville, Bellville Division (-DC), 19/4/1935, *Acock 4269* (S); Bottellary, Stellenbosch Division (-DD), 18/1/1941, *Compton 10377* (NBG).

—3319 (Worcester): In lapidosis (altit. 3) laterum montium prope Tulbagh (-AC), -/11/-, *Ecklon & Zeyher 845* ex parte (C, G, GOET, S, SAM); Ad montes vallis Tulbagh apud Waterfall, -/11/-, *Ecklon & Zeyher 846* ex parte fide Sonder (S, SAM); Tulbagh Waterfall, Tulbagh Division, 600 ft. alt., 9/10/1975, *Williams 2104* (NBG); Drakenstein, Paarl Division (-CA), 13/12/-, *Roxburgh s.n.* (G); Wemmershoek Valley, slopes of W. mountains, Paarl Division (CC), 16/2/1940, *Esterhuysen 4084* (BOL).

—3418 (Simonstown): 1,6 km from Faure at St Raphaels, Stellenbosch Division (-BA), 50 ft. alt., 28/8/1973, *Williams 1858* (NBG).

Without locality: Thunberg (C), *Thunberg 5709* ex parte (UPS), *Zeyher 288* (G), *Drège 7137* (G, K, S).

DISTRIBUTION, VARIATION AND BIOLOGY

The main centre of distribution of this species lies in an area to the east of the Piketberg, from Sauer in a north-westerly direction to just beyond Papkuilsfontein. Here plants occur frequently and have plainly not been burnt for a long time. Elsewhere, as far as can be seen in all the outlying areas, the plant is rather rare being limited to a few individuals only. Plants from these outlying populations often have thicker leaves (*Williams 1858*, *Esterhuysen 20161*). Plants in the Darling Wild Flower Reserve differ in growing only about 300 mm tall, probably due to heavy grazing, the more normal height elsewhere being from 1–1,5 m (*Williams 2409*). The spreading cup-like disc exuding nectar indicates that these plants are most probably pollinated by insects and the rather large black seeds are as usual ejected by a trigger mechanism when ripe. Regeneration takes place from seed but no observations have as yet been made on whether or not this plant will regenerate from the stump after fires although the appearance of its stout rootstock indicates that it could probably do so. Most areas where *D. pedicellata* is found are either being invaded by introduced Acacias or being strip ploughed for agricultural purposes.

DISCUSSION

The open flower with its sinuate disc far exceeding the ovary at once places this plant in the genus *Diosma*. Its general appearance, with linear-lanceolate leaves and flowers produced in much reduced racemes, has led to its being placed

with *Diosma hirsuta* L. in some herbaria. However *Diosma pedicellata* is a distinct species and differs in being usually a tall stiff much-branched shrub, many-stemmed at base, having leaves petiolate with a narrow midrib when dry and the apex with a straight point; flowers 7 mm diam.; calyx glabrous; petals spreading, glabrous, narrowly sessile with margins irregular; fruit becoming pedicellate above the calyx. In *D. hirsuta* the petals persist for a long time at the base of the ripening fruit, a character often seen on herbarium material but in *D. pedicellata* the petals soon delapse and are never seen to be associated with the ripening fruit. *D. pedicellata* is perhaps more closely related to *Diosma aspalathoides* Lam. which occupies a rather similar habitat in deep sandy soil mostly in the vicinity of Mamre. However *D. aspalathoides* can be distinguished by its larger flowers 9–10 mm diam., with petals 3 mm broad and by its leaves which are often sharply recurved at the apex. Another species with a superficially similar appearance and which occupies a habitat somewhat further to the north is *Diosma acmaephylla* E. & Z. It has similar large fruits with long horns that are also pedicellate above the calyx but it can be distinguished by having leaves sessile not petiolate and by the minute pubescence on the petals and calyx.

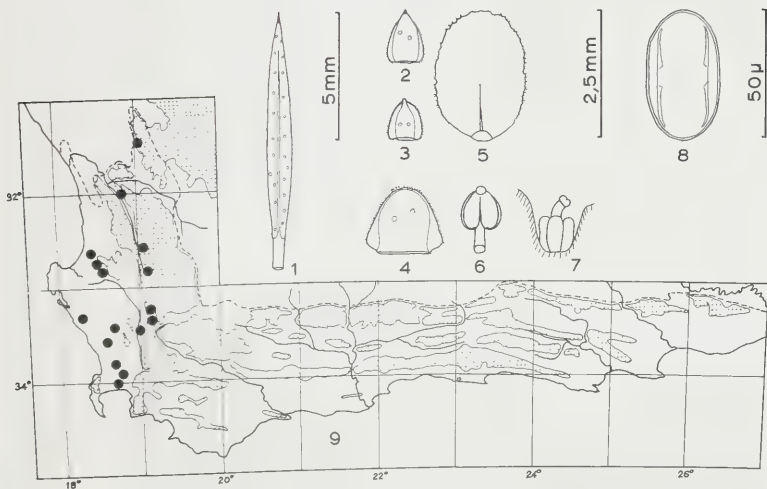


FIG. 14

Diosma pedicellata: 1, leaf. 2, bract. 3, bracteole. 4, calyx lobe. 5, petal. 6, anther. 7, gynoecium. 8, pollen. 9, distribution.



FIG. 15

Diosma pedicellata: Flower showing the typical sinuate disc.

Diosma strumosa Williams, sp.nov. propria propter fructum strumosum profunde foveatum, petalia longiora recurva, antheras vinosas, discum vinosum, stylum et fila pilis minutis sparsis vestita.

Frutex 0,8–1,2 m, erectus, ad basin monocaulis. *Rami* erecti, rigidi, glabri, pauci. *Ramuli* erecti, brevi, minute puberuli, graciles. *Folia* 2,6–6,2 mm longa, 1–1,2 mm lata, lanceolata, obtusa, sessilia, sub-erecta, alterna, omnino minute puberuli, indistincte glanduloso-punctata. *Inflorescentia* terminalis, solitaria vel bini; *flos* 8–10 mm diam., albus, in medio vinosus; *calyx* sessilis, puberulus. *Bractea* 1,3 mm longa, 1,1–1,2 mm lata, ovata, obtusa, tota puberula, marginibus ciliolatis ad basin anguste translucentibus; apex incrassatus. *Bracteolae* duae, 1,3 mm longae, 1 mm latae, sub-ovatae, obtusae, totae puberulae, marginibus ciliolatis ad basin late translucentibus. *Sepala* quinque, 1,9–2 mm longa, 1,4–1,5 mm lata, deltoidea, obtusa, tota puberula, marginibus ciliolatis ad basin late translucentibus; apex incrassatus, elevatus, viridus. *Petala* quinque, 4,1–5 mm longa, 2,1–2,2 mm lata, lanceolata, acuta, sessilia, marginibus ad basin sparsim ciliolatis; apex incrassatus, extus puberulus. *Staminodia* quinque, 0,1 mm diam., globosa, vinosa, vestigialia. *Fila* quinque, 2,1 mm longa, pilis minutis sparsis vestita. *Antherae* quinque, ante anthesin 1 mm longae, 0,7 mm latae, vinosae, glandula sub-immersa coronata. *Pollen* 51 μ longum, 25 μ latum, oblongum. *Discus* sinuato-crenulatus, succulentus, vinosus, patens, ovarium magnopere excedens, nectarifer. *Stigma* 0,3

mm diam., capitellatum, rubescens. *Stylus* ab initio deflexus deinde erectus, 1,7 mm longus, rubescens, pilis minutis sparsis vestita. *Ovarium*, 5-carpellatum, 0,6 mm longum, 0,8 mm diam., glabrum, truncatum. *Fructus* 5-carpellatus, 7 mm longus, 8 mm trans apices, sessilis; *carpella* minute puberula, strumosa, profunde foveata; *cornua* 2 mm longa, patentia. *Semen* 3,8–4 mm longum, 1,7–2 mm latum, piceum, nitens; arillus fasciatus.

Type: CAPE—3320 (Montagu): Soutkloof, 11 km north of the main road near Barrydale (-DC), 760 m alt., 28/6/1977, *Williams 2314* (NBG, holotype: BOL, K, L, M, MO, PRE, S, isotypes).

A collection made by J. P. H. Acocks in 1959, housed in the National Herbarium at Pretoria, exhibiting very peculiar warty fruits, drew my attention to this plant in 1975. However it was not until this year, when, acting upon information very kindly obtained by Mr Hugh Taylor directly from Mr Acocks that this plant was successfully rediscovered.

Shrubs 0,8–1,2 m tall, erect, arising from a single stem at ground level. *Branches* erect, rigid, glabrous, few in number; *bark* smooth, greyish-brown. *Branchlets* erect, minutely puberulous, fairly slender, not very numerous, short due to grazing by animals. *Leaves* 2,6–6,2 mm long, 1,1–2 mm broad, lanceolate, obtuse, fairly erect, sessile, alternate, minutely puberulous on all sides, indistinctly gland-dotted along either side of the midrib and along the margins, turgid on the inside when fresh. *Inflorescence* terminal, solitary or with a second flower closely adjacent; *flower* 8–10 mm diam., with white petals spreading from the wine-coloured disc; *calyx* puberulous, sessile. *Bract* 1,3 mm long, 1,1–1,2 mm broad, ovate, obtuse, puberulous on all sides; margins ciliolate, narrowly translucent below; apex thickened. *Bracteoles* two, 1,3 mm long, 1 mm broad, sub-ovate, obtuse, puberulous on all sides; margins ciliolate, broadly translucent below. *Calyx lobes* five, 1,9–2 mm long, 1,4–1,5 mm broad, deltoid, obtuse, rather whitish, puberulous on both surfaces; margins ciliolate, broadly translucent below; apex thickened, elevated, green. *Petals* five, 4,1–5 mm long, 2,1–2,2 mm broad, lanceolate, acute, sessile, often persisting; margins sparsely ciliolate in the lower third; apex thickened, puberulous outside. *Staminodes* five, 0,1 mm diam., globose, wine-coloured, vestigial, situated towards the outer margin of the disc on the elevated segments of the disc. *Filaments* five, 2,1 mm long, acicular, pinkish, clothed with a few minute hairs, spreading widely after anthesis. *Anthers* 1 mm long, 0,7 mm broad, wine-coloured; apical gland semi-immersed, dark wine-coloured. *Pollen* 51 μ long, 24 μ broad, oblong. *Disc* sinuate-crenulate, fleshy, wine-coloured, spreading wide open, exceeds the ovary by a long way. *Stigma* 0,3 mm diam., capitellate, reddened. *Style* at first deflexed, becoming 1,7 mm long, erect, pinkish, persisting, clothed with a few minute hairs in the lower half. *Ovary* 5-carpellate, 0,6 mm long, 0,8 mm diam., glabrous, truncate. *Fruit* 5-carpellate, 7 mm long, 8 mm across the tips of the horns, sessile; *carpels* minutely puberulous,

lumpy with gland dots in deep pits; *horns* 2 mm long, spreading 45 °, with an immersed apical gland. *Seed* 3,8–4 mm long, 1,8–2 mm broad, black, shining; aril with narrow black stripes.

SPECIMENS EXAMINED

CAPE—3320 (Montagu): 8,3 miles NNW of Barrydale, mountain rhenosterveld, occ. on S. aspect, 4 ft. (-DC), 2 300 ft., 29/7/1959, *Acocks* 20546 (PRE); Southkloof, 11 km north of the main road near Barrydale, 760 m (2 500 ft.) alt., 28/6/1977, *Williams* 2314 (NBG, BOL, K, L, M, MO, PRE, S).

DISTRIBUTION AND BIOLOGY

Disoma strumosa has as yet only been collected from a single locality near Barrydale. However, as there must be many similar habitats in the Rhenosterveld of the Little Karoo, it is quite possible that it will in due course be found elsewhere. It grows on a south-facing slope due south of the spot level 823 m (2 699 ft.) at Southkloof near Barrydale in the Swellendam Division, on soil derived from the Bokkeveld series with *Elytropappus rhinocerotis* as the dominant plant. In June flowers were to be seen in all stages of development and fruits appeared to be just about to ripen. The conspicuous open flowers, the at first deflexed style, the spent anthers that are thrust away to the outside of the flower

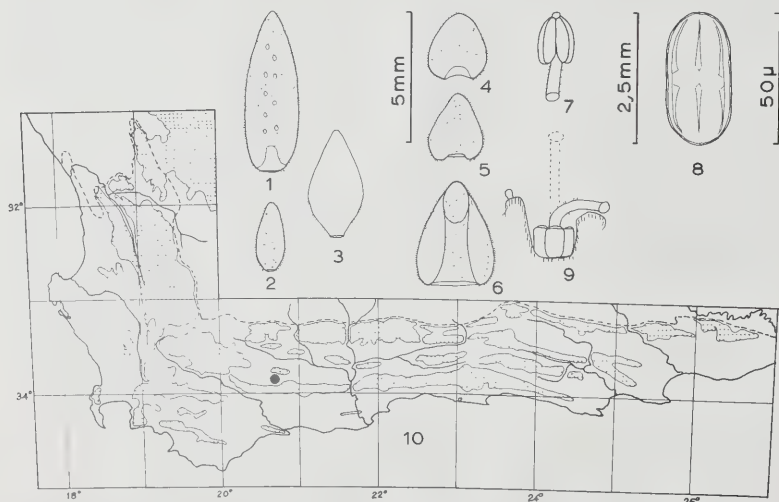


FIG. 16

Diosma strumosa: 1, large leaf. 2, small leaf. 3, petal. 4, bract. 5, bracteole. 6, calyx lobe. 7, anther. 8, pollen. 9, gynoecium and disc. 10, distribution.

and the nectariferous disc are all factors which indicate that pollination is performed by insects. Ripe seeds are ejected by the usual catapult mechanism and regeneration after fires occurs only from seed. Amongst the population examined stems were found with 8–12 annual rings indicating that these plants have regenerated since a fire about 14 years ago. It is 18 years since Acocks visited the site when the plants he observed were 4 ft. tall. The leaves have a faint sweet smell when crushed and the flowers have a faint sweet spicy smell nearer to nutmeg than to cinnamon.

DISCUSSION

The genus *Diosma* may be divided very easily into two sections. The first section in which there is absolutely no trace on the disc of any staminodes at all



FIG. 17

Diosma strumosa: Flower showing disc with staminodes.

and the second in which vestigial staminodes consisting of five sessile swellings appear on the upper outer edge of the disc. In the case in this plant these glands appear to be unusually well-developed. Other characters that place this plant in the genus *Diosma* are the wide open flower and the well-developed open disc which exceeds the ovary by a long way. Characters which exclude this plant from other genera of the *Diosmeae* are: (1) *flowers* terminal, single or paired; (2) *petals* nude; (3) *anther* with a small semi-immersed apical gland; (4) *stigma* capitellate; (5) *style* and *filament* short; (6) *ovary* 5-carpellate.

Diosma strumosa is a very distinct plant standing quite on its own in the genus with its scrofulous deeply pitted fruit, its long recurved petals, its wine-coloured anthers and disc and its style and filaments sparsely clothed with minute hairs. No other species of *Diosma* occupies a similar habitat on Bokkeveld shales, perhaps the nearest approach being that of *Diosma passerinoides* which is also peculiar in that it appears to be associated with silcrete hillocks lying on the Bokkeveld beds. The name is an illusion to the swellings on the fruit.



FIG. 18
Diosma strumosa: Fruit.